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A MANUAL OF DISSECTIONS OF THE HUMAN BODY.

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Owens Coll.
1889.

A MANUAL OF

DISSECTIONS OF THE HUMAN BODY,

FOR THE

USE OF STUDENTS, AND MORE PARTICULARLY

FOR THOSE PREPARING FOR THE HIGHER

EXAMINATIONS IN ANATOMY.

BY

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LONDON:

GEORGE BELL AND SONS, YORK STREET,

COVENT GARDEN.

1881.



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PREFACE.

It has not been found possible in the arrangement of these dissections to classify them under the usual headings of Head and Neck, Upper extremity, Abdomen, and Lower extremity, because many of them would have been included under two or even more of these: in fact, they have often been specially planned with this object, so as to include the border lines of parts which, as they belong strictly neither to one nor the other dissector, are often neglected entirely. Nevertheless, this order has been followed for the most part, and in cases where a dissection involves partly one part and partly another, it has as far as possible been used as an intermediate link between the two. It is taken for granted that the student should have carefully dissected the whole body through before he turns his attention to special dissections. The steps outside the usual routine that are necessary to be taken to expose different structures, form a special feature of the higher anatomical examinations, and, indeed, are not absent from the more ordinary ones, and my experience of the past four years has shown me that students are often nonplussed as to the mode in which questions of this sort should be answered: it is to meet this difficulty, and also to assist those who may wish to carry their anatomical

knowledge further than the usual dissecting-room course would allow them, that this work has been published.

I am thoroughly convinced that it is well nigh impossible to accurately answer many of the questions that are asked in the higher examinations, except they have previously been worked out practically, and am strongly of opinion that special arrangements should be made to meet the requirements of candidates for these tests. If a subject were allotted to four instead of eight dissectors, I think, by mutual arrangement and consultation between themselves, they might each of them perform many special dissections, and might collectively work out many others.

The present manual is the result of special work during the conduct for the past two years of the anatomical class for the first M.B. examination of the University of London. I have been greatly assisted by Messrs. W. A. Lane and J. A. P. Price, Assistant Demonstrators at Guy's Hospital, and to them I desire to express my great obligations for thorough and painstaking work in the prosection for this class.

The principle that has been followed throughout, has been to perform the dissection with the *least possible destruction of surrounding parts compatible with the full exposure of the structure under consideration.* The skin incisions have been carefully planned with this object, and I may incidentally remark that this is often one of the most difficult steps of the dissection, and that further, owing to the retraction of the divided skin, the surface exposed will always be greater than that strictly included between the lines of incision. It will frequently happen that there are several preliminary steps to be taken before the actual point of the question is reached. Thus in a dissection to expose the Thoracic duct, the opening of the

Thoracic and Abdominal cavities may fairly be considered as not an essential part of the dissection, whilst in one to display the Internal Mammary Artery, a detailed account of the Thoracic and Abdominal parietes is evidently required. Students are often puzzled to know whether they are to consider such cavities as opened, or whether they are to write down every separate structure they divide in the course of the dissection. It is difficult to give an absolute answer, but in the absence of specific information from the examiner himself, much will depend upon the amount of time allowed them to write their paper. It may, however, be taken for granted that nothing but naked-eye anatomy is required.

The plan that has been followed in arranging and writing out the various dissections is this:—

1. The position of the body, or part, is indicated.
2. The requisite skin incisions have then been stated carefully.
3. The dissection has been divided into stages numbered I., II., III., &c., and the different steps of each stage have been indicated by the small letters *a*, *b*, *c*, *d*, &c.
4. After each stage short accounts numbered 1, 2, 3, 4, &c., of the structures exposed have been given, following as far as possible some definite direction, as from above downwards, or from side to side, and taking them in the order of bones, muscles, arteries, veins, nerves, &c. The student should avoid giving a bare list: he is not required to *describe* each structure that may be exposed, but he should indicate the *relative positions* of parts succinctly and distinctly.
5. When a structure to be exposed lies in two or

more distinct regions each has, in some cases, been taken separately and indicated by the capitals A, B, C.

I am painfully aware of the imperfections of this work, but trust that as each dissection has been actually performed, want of accuracy will not be one of them. No doubt the absence of plates is a striking deficiency, but in the presence of the beautiful atlases of Professor Ellis, and more recently that of Mr. Godlee, I am strongly of opinion that these will not be found necessary. My object, however, has been mainly to supply a little manual within the reach of all, which may be a guide to actual dissecting-room work.

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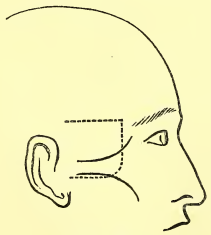
A MANUAL OF DISSECTIONS.

A Dissection to Expose the Structures that are seen on the Removal of the Outer Wall of the Orbit.

Position.—The body lying upon its back, and the face rotated to the opposite side.

I. Skin Incisions.

1. From the **external angular process of the** Frontal bone horizontally backwards an inch above the **Zygoma**, and parallel with it to a point one inch above its root.



No. 1.

2. From just outside the **outer canthus**, obliquely downwards and backwards, over the **Malar process**, to a quarter of an inch below the lower

border of the **Zygoma**, and horizontally backwards to its root.

3. A vertical incision joining the anterior extremities of Nos. 1 and 2.

Reflect the flap backwards, and expose the **superficial fascia**; clear this away, and the **deep fascia** over the muscles, and expose—

1. The **Zygoma** at the lower part of the surface exposed.
2. The lateral prolongation of the **aponeurosis of the Occipito-frontalis muscle** running down to be attached to the preceding. On the removal of this, the **Temporal fascia** is displayed.
3. The outer part of the **Orbicularis palpebrarum** muscle at the outer canthus.
4. The upper fibres of the **Masseter** muscle attached to the lower border of the Zygoma.
5. The anterior part of the **Attrahens aurem** muscle above the Zygoma, at the posterior part of the dissection.
6. A small portion of the **Parotid gland**, covered by its fascia below the Zygoma at the posterior part.
7. Cutaneous arteries from—
 a. The **Anterior Temporal** above the Zygoma.
 b. The **Transverse Facial** below the Zygoma.
 c. The **Lachrymal** at the outer canthus.
8. **Temporal branches of the Facial nerve** passing upwards over the Zygoma, and **Malar** branches running over the Malar process.
9. The **Temporal branch of the Temporo-malar nerve** becoming cutaneous a finger's breadth above the Zygoma, and its communication with a **Temporal branch of the Facial nerve**.

10. The **Malar branch of the Temporo-malar** nerve, cutaneous over the Malar process, and communicating with a **Malar branch of the Facial** nerve.
11. A small twig of the **Lachrymal nerve** at the outer canthus.

II.

a. Remove the part of the **Attrahens aurem muscle** exposed.

b. Raise the fibres of the **Orbicularis palpebrarum muscle** and turn it forwards, dissecting out more fully the **Malar branch of the Temporo-malar nerve.**

c. Detach the **Masseter muscle** from the lower border of the Zygomatic and the Malar processes.

d. Cut through the **Temporal fascia** from the upper border of the Zygoma. It will be found to consist of two layers, and between them will be found some fat, the **Temporal branch of the Temporo-malar** nerve behind the Frontal process of the Malar bone, and a small twig of the **Middle Temporal artery.**

e. Saw through the **Zygoma** in front and behind and remove it, and clear away the fat beneath it in front of the **Temporal muscle,** extending down upon the Superior Maxilla.

There will now come into view—

1. The **part of the Malar bone** previously covered by the **Orbicularis muscle.**
2. The tendon of the **Temporal muscle** attached to the Coronoid process of the lower jaw.
3. The **Masseteric artery, vein, and nerve** behind the Coronoid process, passing out through the Sigmoid notch, seen entering the muscle or divided.

III. Remove completely the **Temporal muscle** from its origin and insertion as far as it is displayed. The **Middle Temporal artery** will be taken away with it, and there will then be exposed—

1. The posterior surface of the **Orbital process of the Malar bone**, the outer surface of the **Ala major of the Sphenoid bone** as low down as the Pterygoid ridge, the anterior part of the **Squamous portion of the Temporal bone**, and a small portion of the outer surface of the **Superior Maxilla.**
2. The upper head of the **External Pterygoid muscle.**
3. The end of the second portion of the **Internal Maxillary artery,** and the **Alveolar branch** of the third portion upon the Superior Maxilla.
4. Twigs of the **Lachrymal artery,** passing through foramina in the Malar bone anastomosing with the Deep Temporal.
5. The anterior and posterior **Deep Temporal** arteries at the front and back parts of the Temporal fossa, and their veins running into
6. A portion of the **Pterygoid plexus of veins** upon the External Pterygoid muscle, joining in front with the **Alveolar plexus.**
7. The anterior and posterior **Deep Temporal** nerves with the corresponding arteries.
8. Oftentimes a small twig of the **Masseteric** nerve to the Temporal muscle behind the posterior Deep Temporal nerve.
9. The two **Posterior Dental** branches of the second **division of the Fifth nerve** lying upon the Superior Maxilla.
10. The **temporal branch of the Temporo-malar** nerve is again seen piercing the Malar bone.

IV.

a. Draw forwards the **Orbicularis palpebrarum muscle**, cut through the **External Tarsal ligament**, and, with the handle of the scalpel, separate the **Dura mater** of the Orbit from the outer wall, to prevent injuring it in the removal of the bone.

b. Chip away with the chisel the Malar bone at the exit of the **Malar** branch of the **Temporo-malar nerve**, and follow this nerve through the bone. Its division into **Temporal** and **Malar branches** may thus be traced, and the nerve itself followed, into the inferior and outer angle of the Orbit.

c. Now proceed to remove the portions of bone forming the outer wall of the Orbit with the chisel. This will be done piecemeal, but the following may be taken as the requisite incisions:—

1. A horizontal one at the upper part of the exposed surface, commencing in front at the **suture** between the **External Angular process** and the **Malar bone**, and ending behind at the **articulation** between the **Squamous** part of the Temporal bone and the **Ala major** of the Sphenoid bone. This is carried onwards until it reaches the **Sphenoidal fissure** behind.
2. A second horizontal one at the lower part of the dissection, commencing in front at the anterior part of the **Malar process**, passing through it, running parallel with No. 1, and ending behind at a point corresponding to the upper. This opens up the **Spheno-maxillary fissure.**
3. A vertical incision joining the hinder extremities of Nos. 1 and 2.

The **middle fossa** of the skull is opened up slightly.

There will now be exposed—

1. The **Dura mater of the Orbit.**
2. The **Infra-orbital branch** of the third part of the **Internal Maxillary artery** entering the Infra-orbital foramen, and the commencement of the **Descending Palatine branches.**
3. The **second division of the Fifth nerve** with the Infra-orbital artery, entering the same foramen, and the following branches ; the whole of the **Temporo-malar** and the upper portions of the two **Posterior Dental.**
4. Two or three **twigs from Meckel's ganglion** to the periosteum of the Orbit. Their source, however, is not seen.

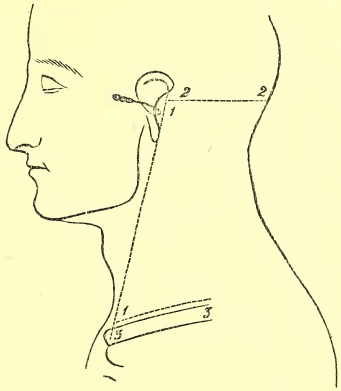
V. Remove the **periosteum** of the Orbit as far back as the Sphenoidal fissure; here it will be seen to be continuous with the Dura mater of the skull. Clear away fat.

There will now be exposed—

1. The **Eye-ball.**
2. The **External and Inferior Recti muscles** outside and below the eye-ball respectively, and the **Inferior Oblique muscle** passing below the Inferior, and internal to the External Rectus muscle.
3. The **Lachrymal gland** at the upper and outer part of the orbit.
4. The **Lachrymal nerve and artery** above, the nerve joining with the Temporo-malar.
5. The **nerve** from the Third to **the Inferior Oblique muscle** entering its posterior border.

A Dissection to Expose the Vertebral Artery.

Position.—A block should be placed under the shoulders, the head allowed to hang supported by a smaller one, and the face rotated to the opposite side on which the dissection is to be made.



No. 2.

I. Skin Incisions.

1. From immediately in front of the Mastoid process to the **Sterno-clavicular articulation.**
2. Transversely from the upper end of No. 1 to the **Occipital tuberosity.**
3. Transversely from the lower end of No. 1 along the **upper border of the Clavicle for the inner half.**

Reflect the flap backwards and expose the superficial fascia containing—

1. The **Platysma myoides** muscle at the lower and front part.
2. **Cutaneous arteries** from:—The **Posterior Auricular** behind the ear. The **Occipital** upon the Occiput. The **Ascending Cervical** at the lower part through the Sterno-mastoid muscle. At the upper part of the same muscle from the **Sterno-mastoid branch of the Occipital** or **External Carotid.** From the **Superficial Cervical** over the Trapezius muscle. From the **Suprascapular** over the Clavicle.
3. The upper part of the **External Jugular vein.**
4. The **Great Auricular nerve** at its distribution over the Mastoid process, and the commencement of the branches to the Pinna and face.
5. The **Small Occipital nerve** perforating the deep fascia near the skull.
6. The **Great Occipital nerve** perforating the fascia lata about half an inch from the anterior border of the Trapezius muscle, close to the Occiput.
7. The **Third Occipital nerve** perforating behind the distribution of the Great, and running up to the Occipital protuberance.
8. Cutaneous filaments from the **third and fourth Cervical nerves** ramifying over the lower part of the Trapezius muscle.
9. Filaments of the **Superficial Cervical nerve** perforating the Platysma muscle over the centre of the Sterno-mastoid muscle..

II. Remove the **Platysma muscle,** dissecting out at the same time the **Sternal** and **Clavicular** branches of the **third** and **fourth Cervical nerves.** The **External Jugular Vein** will now be displayed as far as the point of its perforation of the deep fascia at the lower part of the posterior triangle.

III. Clean away the **fascia lata**, preserving and dissecting further the preceding vessels and nerves to the extent that this is possible without removal of muscles. There will now be exposed—

1. The **Sterno-mastoid muscle** in front.
2. The anterior portion of the **Trapezius muscle** behind.
3. In the angular interval between the preceding muscle at the skull, either a dense **fascia** or the **Complexus muscle.**
4. The **Splenius capitis muscle,** and the slip of the **Splenius colli** to the transverse process of the Atlas. This muscle runs downwards and backwards highest of those forming the floor of the **posterior triangle.**
5. The attachments of the **Levator anguli scapulæ muscle** to the upper three or four Cervical transverse processes.
6. The **Scalenus medius muscle** immediately below the preceding, and behind the Sterno-mastoid muscle.
7. The posterior edge of the **Scalenus anticus muscle,** in the case of a narrow Sterno-mastoid muscle.
8. The posterior belly of the **Omo-hyoid muscle** crossing the Scalenus medius obliquely at the lower part.
9. Branches of the **Superficial** and **Ascending Cervical arteries** in the upper part of the posterior triangular space.
10. The **Transverse Cervical artery** crossing from beneath the lower part of the Sterno-mastoid muscle and passing under the Omo-hyoid muscle.
11. The **third part of the Subclavian artery** turning over the first rib, and the **Posterior Scapular** artery when it is a branch of this part of the vessel.

12. The whole length of the **External Jugular vein** and its sinus joined below by the **Transverse Cervical, Suprascapular** and **Posterior Jugular branches,** and **communicating** over the Clavicle with the Cephalic vein, and over the Sterno-mastoid muscle with the Anterior Jugular vein
13. The **Posterior Auricular nerve, artery,** and **vein** behind the Pinna.
14. The **Great Auricular nerve** turning round the posterior border of the Sterno-mastoid muscle at its upper part and dividing into branches for the skin over the Mastoid process, Pinna, and the Parotid gland.
15. The **Small Occipital nerve** running up the posterior border of the Sterno-mastoid muscle.
16. The **Great Occipital nerve** now seen perforating the Trapezius muscle near its anterior border and ramifying over the Occiput accompanied by the **Occipital artery and vein.**
17. The **Third Occipital nerve** perforating the Trapezius internal to the preceding.
18. The **Superficial Cervical nerve** turning over the Sterno-mastoid muscle, and running transversely across beneath the External Jugular vein.
19. The superficial descending **Sternal** and **Clavicular branches of the Cervical plexus.**
20. The **Spinal-accessory nerve** crossing transversely from the upper third of the Sterno-mastoid muscle downwards and backwards to the Trapezius muscle.
21. **A branch of the Cervical plexus from the third nerve** to the Levator anguli scapulæ muscle.
22. **Branches from the third and fourth Cervical nerves** to the Trapezius muscle. They accompany the

Spinal-accessory nerve and communicate with it, and some perforate the Trapezius muscle and supply the skin over it. These have been mentioned with the superficial fascia.

23. The **Phrenic nerve** in case the Scalenus anticus muscle is exposed.
24. The **fifth, sixth, and seventh Cervical nerves** forming part of the **Brachial plexus.**
25. The **nerve to the Rhomboid** muscle perforating the outer border of the Scalenus medius muscle at the upper part.
26. The **Posterior Thoracic nerve** perforating the same muscle lower down, and running down behind the Brachial plexus.
27. The **Suprascapular nerve** arising from the cord formed by the junction of the fifth and sixth nerves, and crossing the space transversely a little above the Clavicle.
28. The **nerve to the Subclavius muscle** running down over the third part of the Subclavian artery.
29. The **branch from the Descendens noni nerve** to the posterior belly of the Omo-hyoid muscle, passing from beneath the Sterno-mastoid to the lower border of the muscle it supplies.
30. The **Glandulæ concatenatæ** along the posterior border of the Sterno-mastoid muscle, and a small piece of the **Parotid gland** immediately in front of the Mastoid process.

IV. Remove now—

a. The **External Jugular vein** and its branches.

b. The **Great Auricular**, the **Superficial Cervical**, the **Sternal** and **Clavicular**, the **Muscular to the Trapezius** and the **Spinal-accessory nerves.**

c. Take away the posterior portion of the **Sterno-mastoid muscle** by cutting through the mastoid and clavicular attachments and removing the piece. The branches of the **second nerve to the muscle** will be cut through.

d. Detach the **Trapezius muscle** from its occipital attachment, and hook it well back.

e. Cut through the **Omo-hyoid** and **Splenius capitis muscles**, and remove the attachments to the transverse process of the Atlas, of the **Splenius colli, Levator anguli scapulæ**, and **Scalenus medius muscles.**

There will now be exposed—

1. The **transverse process of the Atlas.**
2. The posterior belly of the **Digastric muscle** running downwards and forwards from the deep surface of the Mastoid process.
3. The **Stylo-hyoid muscle** parallel with its anterior border.
4. The **Trachelo-mastoid muscle** at the upper part inserted into the outer surface of the Mastoid process.
5. The **Complexus muscle,** behind the immediately preceding muscle.
6. A small piece of the **Superior Oblique muscle** is seen running up from the transverse process of the Atlas between the Trachelo-mastoid and Complexus muscles.
7. The **Rectus capitis anticus major muscle** is seen in front arising and running upwards from the anterior tubercles of the transverse processes of the third, fourth, fifth, and sixth Cervical vertebræ.
8. The **Scalenus anticus muscle** is seen below the Rectus muscle inserted into the same points.

9. A further piece of the **Splenius colli muscle** is seen by the removal of the Sterno-mastoid muscle.
10. The **Longus colli muscle** is seen on the front of the vertebral column anterior to the Rectus anticus major, and Scalenus anticus muscles.
11. Above the Manubrium the outer margin of the **Sterno-hyoid** muscle is displayed.
12. The **Common Carotid artery**, its **Internal** and **External branches**, and the **Occipital** offset of the latter.
13. The **first part of the Subclavian artery** and the following branches :—**Thyroid axis** giving off **Transverse Cervical** and **Suprascapular** offsets, which run backwards over the Scalenus anticus muscle, and the **Inferior Thyroid** running upwards beneath the Common Carotid, having given off previously the **Ascending Cervical** branch which passes upwards in the interval between the Scalenus anticus and Rectus anticus major muscles, and sends numerous offsets to the posterior triangle. The commencement of the **Internal Mammary branch** of the first part of the Subclavian, but the Vertebral offset is not seen, as it lies under cover of its vein.
14. Branches of the **Princeps Cervicis branch of the Occipital artery** are seen superficial to the Complexus muscle.
15. The **Internal Jugular vein** parallel with and outside the Common Carotid artery, and its Occipital branch.
16. The part of the **Anterior Jugular vein** which lies below the Sterno-mastoid muscle.
17. The upper part of the **Subclavian vein** and its **Vertebral** branch.
18. The **Thoracic and right lymphatic ducts** opening into

the junction of the Internal Jugular and Subclavian veins.

19. The **first four Cervical nerves** and their loops. Only, however, the lower part of the first loop is seen. **The communications of the loop of the Atlas** with the Hypoglossal nerve, and the Superior Cervical ganglion. Branches of all the loops to the anterior Recti muscles.
20. The **Hypoglossal** nerve, the **Descendens noni** branch. The **Communicans noni** branches of the second and third Cervical nerves pass over or under the Internal Jugular vein, and join the Descendens in a loop. The **branch from this loop to the Sterno-hyoid muscle** is seen.
21. The lower two **ganglia of the Sympathetic** nerve, their **connecting cord**, and the lower part of the connection with the superior ganglion, the upper part of this trunk being overlapped by the Internal Jugular vein. **The communication of the middle ganglion with the fifth and sixth nerves**, and of the inferior **with the seventh and eighth.**
22. The **Phrenic nerve**, and its **communication with the nerve to the Subclavius** muscle, lying upon the Scalenus anticus muscle.
23. The **fifth, sixth, seventh, and eighth Cervical nerves, and the cord from the first Dorsal nerve** to the Brachial plexus.

V. Remove now—

a. The upper part of the **Complexus muscle** with its **nerves from the Suboccipital**, and **Great Occipital, and small arteries** from the **Vertebral** entering its deep surface, and from the **Princeps Cervicis** overlying it.

b. Detach the posterior belly of the **Digastric muscle** from its origin and turn it forwards, its **nerve from the Facial** will be divided.

c. Cut through the origin of the **Trachelo-mastoid muscle**, its **nerve from the Great Occipital** will be cut.

d. Detach the **Scalenus anticus muscle** from its origin and turn it back, the following structures will be cut through with it:—**The Phrenic nerve and its communication** with the Subclavian nerve. The **Transverse Cervical**, the **Suprascapular**, and **Ascending Cervical arteries.**

e. Divide the **Internal Jugular vein** above and below, and remove the intermediate piece.

f. Remove the **Thoracic duct** which crosses superficial to the Vertebral artery and vein.

There will now be exposed—

1. The **Occipital bone.** The **Mastoid process** of the Temporal bone, and the **transverse processes** of the Cervical vertebræ. The **posterior arch of the Atlas** is seen in the floor of
2. The **Suboccipital triangle** bounded internally by the **Rectus capitis anticus major**, below by the **Inferior Oblique**, and above by the **Superior Oblique muscles.**
3. The **Rectus capitis lateralis muscle** is seen running up from the transverse process of the Atlas, and the **Intertransverse muscles and ligaments between the transverse processes.**
4. The **Longus colli** muscle is seen more fully in front of the vertebræ.
5. The whole of the **Subclavian artery** is displayed below. Its Vertebral branch overlapped by **the vein,**

and surrounded by branches of the inferior Cervical ganglion, is seen passing from the first part of the Subclavian artery to the foramen in the sixth Cervical transverse process; and is again exposed in its upper part above, lying upon the posterior arch of the Atlas in the floor of the Suboccipital triangle.

6. A further part of the **Occipital artery** is seen above, and superficial to the same triangle a **general anastomosis between the Princeps and Profunda Cervicis arteries**, and other twigs from **the Vertebral. Muscular branches**, and the occasional **Mastoid branch** of the **Occipital** may be seen.
7. The **radicles of the Vertebral vein** are exposed overlying the Suboccipital triangle.

The following are also exposed—

1. The **Suboccipital nerve** between the Vertebral artery and the posterior arch of the Atlas giving branches to both the Oblique and posterior Recti muscles.
2. The **Great Occipital nerve** (the internal branch of the posterior primary division of the second) turning round the lower border of the Obliquus inferior muscle. **The anterior primary branch of the second nerve** upon the transverse process of the Axis external to the Vertebral artery.
3. A further portion of the **Hypoglossal nerve** closely united with the Vagus.
4. **The Vagus** nerve.
5. The **Spinal-accessory nerve.**
6. **The Superior Cervical ganglion.**
7. The **loop of the Atlas and its communications** with the Hypoglossal and Vagus nerves and the superior ganglion of the **Sympathetic nerve.**

VI.

a. Cut away the **Superior Oblique muscle** entirely, and detach the **Inferior Oblique muscle** from the transverse process of the Atlas and turn it down.

b. Remove the **Rectus lateralis**, the **Recti antici major and minor muscles**, and detach the **Longus colli muscle** from the third, fourth, fifth, and sixth transverse processes.

c. Chip away with the chisel the **anterior tubercles of the Cervical transverse processes and small portions of the bone behind**, leaving the posterior tubercles; in this way the vertebral foramina will be opened up.

d. Remove with the chisel and small saw **a piece of the Occipital bone** by the following incisions:—

1. From the **Occipital tuberosity** vertically to the **foramen magnum**, behind.
2. From the **Occipital tuberosity** transversely to the **articulation of the Mastoid portion of the Temporal bone with the Occipital.**
3. Vertically down from the anterior end of No. 2, through the middle of the **Occipital Condyle**, to the foramen magnum.

e. Divide the **Capsular, Posterior Occipito-atloid** and **Check ligaments** of the same side, and the **first process of the Denticulate ligament.**

f. Take away a small piece of the lower part of the **lateral lobe of the Cerebellum.**

g. Remove the **Vertebral vein**, which conceals the artery both below and in the foramina of the transverse processes.

The **Vertebral artery** is now exposed in its whole course,

with its **Anterior and Posterior Spinal, Meningeal,** and the commencement of the **Posterior inferior Cerebellar** branches.

It is seen lying in the foramina in the transverse processes of the Cervical vertebræ surrounded by branches of the **Sympathetic nerve** derived from the **Inferior Cervical ganglion,** and having the **Anterior primary branches of the Cervical nerves** behind it, except the **first,** which is internal, and the **second,** which is external to it. Within the skull the **eighth** and **ninth nerves** pass over it, and the **Spinal-accessory** is separated from it by the first process of the **Ligamentum Denticulatum.**

A Dissection to Expose the Otic Ganglion and the Cartilaginous portion of the Eustachian Tube.

Position.—The body lying upon the back, and the face rotated to the opposite side.

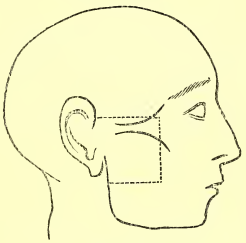
I. Skin Incisions.

1. Along the **upper margin of the Zygoma,** from the anterior extremity of the origin of the Masseter muscle to the posterior part of the **Condyle** of the jaw.
2. Vertically along the **anterior margin of the Masseter muscle** to a point midway between the origin and the lower margin of insertion.
3. From the lower end of No. 2 transversely backwards to the **posterior margin of the Ramus** of the jaw.

Reflect the flap backwards, and expose the **superficial fascia.**

II. Clear this away and expose—

1. The Zygoma.
2. The Temporal fascia just at its attachment to the Zygoma.
3. The Parotid fascia, that covering the Masseter muscle, and a small piece of the Buccal fascia in front.
4. The Temporal, Malar, and Infraorbital branches of the Facial nerve emerging from the Parotid gland.
5. The Transverse Facial artery and vein parallel with and below the Zygoma.



No. 3.

6. The duct of the Parotid Gland below the artery, with branches of the nerve above and below it.

III. Remove the preceding structures and expose—

1. A portion of the neck of the jaw, the Capsular and the External lateral ligaments of the articulation.
2. The Masseter muscle running downwards and backwards from the Zygoma.
3. A small piece of the Buccinator muscle at the anterior margin of the preceding.
4. Emerging from the front border of the Masseter, the Buccal branch of the fifth nerve.
5. The Buccal branch of the Internal Maxillary artery accompanying it.

6. The **Anterior Internal Maxillary vein** also issuing from beneath the Masseter muscle.
7. The **Parotid gland** upon the Masseter muscle.

IV.

a. Divide both layers of the **Temporal fascia** at their attachment to the Zygoma.

b. Remove the anterior part of the **Parotid gland**, the **Socia parotidis**, and the included part of the **Facial nerve.**

c. Remove the **Masseter muscle** within the limits of the skin incision. In doing this **its nerve from the third division of the Fifth, with its artery from the Internal Maxillary**, and **its vein to the Pterygoid plexus** will be divided.

d. Saw through the **Zygoma** in front and behind, and remove the included piece of bone.

The following structures are now exposed—

1. The upper half of the **Ramus, and the Coronoid process** of the jaw, a portion of the upper **Alveolus, and the tuberosity of the Superior Maxilla.**
2. The **Posterior Dental nerve** and artery, and the **Alveolar plexus of veins** lying upon the Superior Maxilla.
3. Part of the fleshy fibres and the insertion of the **Temporal muscle** into the Coronoid process.
4. The **Buccal nerve, artery, and vein** in front of the Temporal tendon.
5. The divided end of the **Masseteric nerve, artery, and vein** behind the tendon emerging from the Sigmoid notch.
6. The **Auriculo-temporal nerve** at the posterior part, running vertically upwards.
7. The **Temporal artery and vein** with the preceding.

V.

a. Divide the jaw through its neck, and again transversely across the Ramus halfway down.

b. Cut through the **Temporal muscle** parallel with the upper skin incision.

c. Remove the piece of bone with the muscle attached. **Branches of the Buccal nerve** and occasionally others **from the Masseteric nerve** to the Temporal muscle will be divided, and the **Middle Temporal artery** removed in its substance.

There will now be exposed—

1. The **External Pterygoid muscle** lying transversely.
2. The **Internal lateral ligament** passing vertically down beneath the Ramus.
3. The **Internal Maxillary artery,**[1] at first crossing the ligament, then lying upon the muscle, and passing between its two heads in front. Whilst the artery is lying upon the External Pterygoid muscle, it is seen giving off the **anterior and posterior Deep Temporal**, the **Masseteric**, **Buccal**, and **Pterygoid** branches; and whilst upon the ligament the **Inferior Dental** offset.
4. Lying upon the muscle the superficial part of the **Pterygoid plexus of veins**, joining in front with the **Alveolar**, receiving branches corresponding to those of the artery, and forming behind the **Internal Maxillary vein** which joins **the Temporal.**
5. Issuing above the upper border of the muscle, the **anterior and posterior Deep Temporal nerves.** Passing between the two heads, the **Buccal** nerve and the anterior part of the **Internal Maxillary** artery;

[1] When it occupies the normal position superficial to the External Pterygoid Muscle, otherwise it is beneath it.

and emerging from the lower border the **Dental** and **Gustatory** nerves, the latter being anterior. The **Buccal nerve** is frequently seen to join the anterior Deep Temporal, and the posterior Deep Temporal may be derived from the Masseteric nerve.

VI.

a. Divide the **Internal Maxillary artery** in front and behind, cut through its branches, and remove it.

b. Disarticulate **the jaw**. Remove the **External Pterygoid muscle** from its origin, and take it away; dividing at the same time the **Buccal nerve**.

c. Divide carefully with the chisel the **External Pterygoid plate** and remove it, cutting the fibres of origin of the **Internal Pterygoid muscle** from its deep surface.

There will now be exposed—

1. The **Internal Pterygoid muscle** passing obliquely downwards and backwards.
2. The ascending branches of the first part of the **Internal Maxillary** artery, before hidden by the jaw; viz., **Middle Meningeal**, running up to the Foramen Spinosum, the **Small Meningeal**, often a branch of the preceding to the Foramen Ovale, the **Tympanic** branch backwards to the Glasserian fissure.
3. The deep part of the **Pterygoid plexus of veins**.
4. The **Third division of the Fifth nerve** issuing from the Foramen Ovale and dividing into an *anterior or motor part* from which the anterior and posterior **Temporal**, the divided **Masseteric** and **Buccal nerves**, and the **branch to the External Pterygoid muscle** may be traced; and a *posterior or motor-sensory part* from which the **Auriculo-temporal** with its two roots embracing the Middle Meningeal artery, and

the **Dental** and **Gustatory** branches may be followed. A **communication** between the Auriculo-temporal and the Facial nerves may be seen.

5. The **Chorda Tympani nerve** issuing from the canal of Huguier and joining the Gustatory nerve.

VII. Divide the **Internal lateral ligament.** Cut through the **Dental and Gustatory nerves,** and reflect them carefully upwards. There will now be seen—

1. The **nerve to the Internal Pterygoid** entering the posterior border of the muscle.
2. The **Otic ganglion** lying upon the muscle, closely connected with its nerve.
3. The **Tensor palati** muscle lying beneath it.
4. The **branch of the Otic Ganglion** to the Tensor palati, and that to the **Tensor tympani muscle** passing backwards.
5. The **Lesser Petrosal nerve** coming through the spine of the Sphenoid, and the **communication** with the Sympathetic nerve on the Middle Meningeal artery may be traced to the ganglion.

VIII. Divide—

a. The **Internal Pterygoid muscle,** at its attachment to the Ramus, and remove it. Its **nerve** will be cut through.

b. The **Great** and **Small Meningeal arteries,** and the **Pterygoid veins,** and clear them away.

c. The **Third division of the Fifth Nerve,** and remove it entirely. The **Chorda Tympani nerve** will be destroyed.

d. Cut through the **Tensor palati muscle** from its origin, and at the point where it turns round the Hamular process, and take it away.

The outer surface of the **cartilaginous portion of the**

Eustachian tube is now fully exposed, from the retiring angle between the Squamous and Petrous portions of the Temporal bone, to its attachment to the Internal Pterygoid plate.

The following structures are also seen—

1. The **Levator palati muscle** arising from its lower membranous part, and passing over
2. The arched upper border of the **Superior Constrictor**, which muscle arises from the lower third of the Internal Pterygoid plate.
3. Lying upon the preceding the **Ascending Pharyngeal artery**, dividing into the following branches:—one following the tendon of the Tensor palati muscle, one passing over the upper border of the Superior Constrictor muscle, another to the Middle Lacerated foramen, and sometimes one to the Anterior Condyloid.

A Dissection to Expose the Hypoglossal Nerve in the Extra-Cranial part of its course.

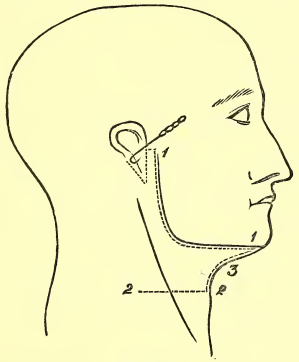
Position.—The body lying upon its back, the face rotated to the opposite side to that upon which the dissection is to be made, the jaw pulled well upwards, so as to extend the head, and the Hyoid bone drawn downwards by hooks.

I. Skin Incisions.

1. From the **middle line** in front along the **base of the jaw**, and the posterior border of the **Ramus** as high as the **Zygoma**, then backwards, winding round

the attachment of the **Pinna**, to the **Mastoid process.**

2. Transversely from the middle line opposite the **Hyoid bone**, outwards to a point vertically below the hinder end of No. 1.



No. 4.

3. Join the anterior ends of Nos. 1 and 2 by a vertical incision along the median line.

Reflect the flap backwards, and there will be exposed the **superficial fascia**, containing—

1. Twigs of the **Posterior Auricular artery** behind the Pinna.
2. An **Anterior Auricular** artery to the front of the Pinna.
3. Cutaneous offsets of the **Submental branch of the Facial artery** below the jaw.
4. The **Great Auricular nerve** crossing the Sterno-mastoid muscle obliquely towards the Pinna, and dividing into **Mastoid, Auricular, and Facial branches.**

5. Cutaneous twigs of the upper branch of the **Superficial Cervical nerve** beneath the jaw.

II.

a. Remove the **superficial fascia**, and expose the **Platysma myoides muscle** running up to the base of the jaw, from the middle line nearly as far back as the angle. Take this away, and expose the **fascia lata**, which should then be cleaned away. In the course of this dissection, the upper branch of the **Superficial Cervical nerve**, and the **Infra-maxillary branch of the Facial nerve** will come into view. They will both be found to lie at first, *beneath* the deep fascia, and to communicate with one another ; they then perforate the fascia, and again communicate, and then the former is distributed to the skin, and the latter to the Platysma muscle. They may now be removed.

When this is done, the **Parotid** and **Submaxillary glands** will come into view, with many other structures. It will be convenient to take the glands away at once, to avoid enumerating the same parts twice over.

b. In removing the **Parotid gland**, the following structures will be found in its substance from the surface inwards:—

1. The commencement of **the Facial nerve**, and its division into **Cervico-facial and Temporo-facial offsets**. When the gland is completely removed the exit from the Stylo-mastoid foramen will be seen, and the **Posterior Auricular**, and the **branches to the Digastric**

and **Stylo-hyoid muscles** observed coming off close to the point of exit. The nerve should be removed.

2. The **External Jugular vein** and the commencement of its **communications** with the Internal Jugular and Facial veins. These and the **Internal Maxillary vein** should be divided, and **the External Jugular** removed.
3. The **External Carotid artery**, its **Anterior** and **Posterior Auricular, Temporal,** and **Internal Maxillary** branches, and the **Transverse Facial** offset of the Temporal. All these should be divided, and the trunks removed.

c. In removing the **Submaxillary gland**, the **Facial vein** will be found passing over it, and should be cut away; **the Facial artery** traversing it, or grooving its deep surface and giving off in its substance the **Submental** and **Submaxillary** offsets. It also should be divided above and below, and these branches taken away.

The following structures will now be exposed—

1. The body of the **Hyoid bone** and the greater Cornu, at the lower part of the dissection.
2. Part of the **Sterno-Mastoid muscle** behind, running up to the Mastoid process.
3. Both bellies and the tendon of the **Digastric muscle.** The posterior belly running downwards and forwards from beneath the Sterno-mastoid muscle, the tendon attached by areolar tissue to the body of the Hyoid bone, and the anterior belly running thence,

upwards and forwards, to the lower jaw close to the Symphysis.

4. The **Stylo-hyoid muscle** parallel with, and in front of the posterior belly of the Digastric muscle, seen splitting below for the tendon of the latter to be attached to the body of the Hyoid bone.
5. The **Mylo-hyoid muscle**, running up from the body of the Hyoid bone to the lower jaw.
6. The **Hyoglossus muscle**, seen in small part behind the Mylo-hyoid, and running up beneath it.
7. The under surface of the **angle of the jaw** can be seen, and the **Internal Pterygoid muscle** lying upon it.
8. The **External Carotid artery**, and the following branches: the commencement of the **Occipital** and **Lingual**: the origins of the divided **Temporal, Posterior Auricular**, and **Facial**. The last may be seen giving off the **Tonsillar** and **Inferior Palatine** offsets.
9. Owing to the retraction of the Sterno-mastoid muscle on the division of the process of fascia, extending from the angle of the jaw to its anterior border, the **Internal Carotid artery**, and the
10. **Internal Jugular vein** behind it.
11. The **Mylo-hyoid branch of the Inferior Dental** artery lying upon its muscle.
12. Radicles of the **Anterior Jugular vein** beneath the chin.
13. The **Vagus nerve** between the Internal Carotid artery and the Internal Jugular vein.
14. The **branch of the Inferior Dental nerve, to the Mylo-hyoid and Digastric muscles.** The small twig supplying the latter, however, being traceable before the removal of the Submaxillary gland.
15. The **Hypoglossal nerve** winding round the Occipital

artery, and then running transversely forwards beneath the posterior belly of the Digastric muscle. The **Descendens noni** branch upon the External Carotid artery and the commencement of the **twig to the Thyro-hyoid muscle.**

16. **Lymphatic glands** of the Submaxillary region.

III.

a. Cut through the **Mylo-hyoid muscle** at its attachment to the jaw and the median raphé, and turn it downwards.

b. Remove the exposed portion of the **Sterno-mastoid muscle.**

c. Remove the whole of the **Digastric** and the **Stylo-hyoid muscles.** The nerves to these and the preceding muscles will be divided.

d. Divide the **External Carotid artery** below the point at which it is crossed by the Hypoglossal nerve. Cut through its **Occipital** offset, and the **Inferior Palatine** and **Tonsillar branches of the Facial** artery. Remove the upper portion and pull down the lower.

The **Styloid process** will now come into view, and the different structures attached to it.

1. The **Stylo-glossus muscle, and Stylo-hyoid and Stylo-maxillary ligaments** to the tip.
2. The origin of the **Stylo-hyoid muscle** from the centre of the outer surface, and
3. The **Stylo-pharyngeus** muscle from the inner side of the base.

e. Cut the process through at the base with the forceps, and pull it down with the structures attached to it, having previously detached the **Stylo-glossus muscle.**

f. Divide the **Internal Jugular vein** above and below, and remove it.

The following structures will now come into view—

1. Above, the **transverse process of the Atlas**, and a small portion of the **Rectus capitis lateralis muscle.**
2. The **Hyoglossus** muscle running upwards from the body, and greater and lesser Cornua of the Hyoid bone to the side of the tongue.
3. The **Stylo-glossus** muscle at the upper border of the preceding muscle, divided posteriorly.
4. The **Genio-hyoid muscle** in front, running up from the body of the Hyoid bone to the lower jaw.
5. The **Genio-hyo-glossus** muscle in front of the Hyoglossus, and above the Genio-hyoid muscle.
6. The **Middle Constrictor** muscle, posteriorly.
7. Lying upon the **Hyoglossus** from above downwards:
 - *a.* The **Gustatory nerve**, and the **Submaxillary ganglion.**
 - *b.* The **deep part of the Submaxillary gland**, with **Wharton's duct** running upwards and forwards from it, and passing beneath the preceding nerve.
 - *c.* The **Hypoglossal nerve** lower down. It may now be seen in the whole of its course. At its commencement it is closely conjoined with the **Vagus** nerve, it then descends vertically, next turns forward on the **Hyoglossus**, and is finally distributed to the **Hyoglossus, Stylo-glossus, Genio-hyoid,** and **Genio-hyo-glossus** muscles. The commencement of the **Descendens noni** and **Thyro-hyoid branches** may also be seen, as well as the **loops** of communication with

the Gustatory nerve, at the anterior border of the Hyoglossus muscle.

8. Issuing from the anterior border of the Hyoglossus muscle is the **Ranine branch of the Lingual artery**, with its vein.
9. Passing under the posterior border of the same muscle are from above downwards—
 a. The **Glosso-pharyngeal nerve**, which may also be seen from the base of the skull downwards.
 b. The **Stylo-hyoid ligament**, in the centre.
 c. The **Lingual artery**, lowest of all.
10. The **Internal Carotid artery** will be seen running up to the base of the skull, deep down in the hollow behind the Ramus of the jaw.
11. The **Ascending Pharyngeal artery** in front of, but parallel with the Carotid.
12. The **Vagus nerve** is seen passing down behind the artery, and giving off the **Superior Laryngeal nerve** beneath it, and the **Pharyngeal** branch either over or under the vessel.
13. The **Spinal-accessory nerve** is seen with the Vagus. It will probably be cut below by the removal of part of the Sterno-mastoid muscle.
14. The **Superior Cervical ganglion** of the Sympathetic nerve will be displayed.
15. The **loop of the anterior primary branches of the first and second Cervical nerves** in front of the transverse process of the Atlas.
16. **Communications** between this loop and the **Vagus, Hypoglossal,** and **Sympathetic** nerves are traceable.

The preceding structures of the **Submaxillary region** may all be displayed if the preceding directions have been followed; a more satisfactory view, may, however, be

obtained if, after the reflection of the Mylo-hyoid muscle (Stage III.), the following steps be taken:—

a. Sew the tip of the tongue to the Septum nasi.

b. Divide the lower jaw and investing soft parts, in front near the Symphysis, and behind at the junction of the body and Ramus, and turn the included piece upwards.

In the anterior incision the following structures will be divided:—

1. Skin.
2. Superficial and deep fasciæ.
3. The Orbicularis oris muscle, and Inferior Coronary artery.
4. Depressor labii inferioris muscle.
5. Levator menti muscle.
6. The bone.
7. The mucous membrane of the mouth.

In the posterior incision—

1. Skin.
2. Superficial and deep fasciæ.
3. Facial vessels lying upon the bone.
4. Supra-maxillary, and Buccal branches of the Facial nerve.
5. Buccinator muscle.
6. Depressor anguli oris muscle.
7. Bone, and Inferior Dental nerve and artery in its substance.
8. The mucous membrane of the mouth, which should also be detached from the bone between the two incisions.

If the bone be turned up in this way, the Sublingual gland and the Sublingual branch of the Facial artery will in addition come into view, above the anterior border of the

Genio-hyo-glossus muscle. The **Hypoglossal nerve** may also be more fully traced into the substance of the tongue.

A Dissection to Expose fully the first Dorsal Nerve.

Position.—The body is to be supported by blocks upon the opposite shoulder to that on which the dissection is to be made. The shoulder to be well pulled down.

I. Skin Incisions.

A semilunar flap of skin, following the **course of the first rib**, is to be removed by the following incisions:—

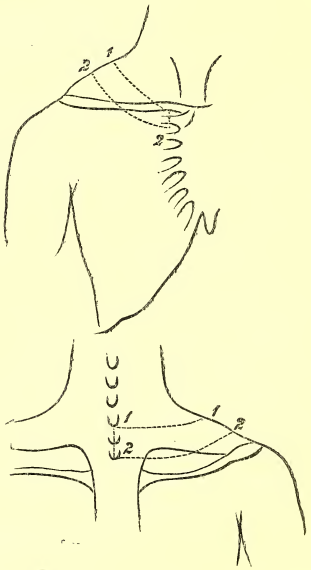
1. From the **seventh Cervical spinous process**, to the lower border of the **inner end of the Clavicle** at its articulation with the Sternum.
2. From the **second Dorsal spinous process**, to the upper border of the **second Costal cartilage** at the Sternum.
3. Vertical incisions joining the anterior and posterior ends of the preceding.

The flap thus removed will cross in front the middle third of the Clavicle.

There will now be exposed the **superficial fascia**, containing, passing from before backwards—

1. The **Platysma myoides muscle** over the Clavicle.
2. Arterial twigs over the Clavicle from the **Suprascapular**. In the body dissected a branch from the **Acromio-thoracic artery** ascended over the bone.
3. A **communication** over the Clavicle between the Cephalic and the External Jugular veins.

4. The descending cutaneous branches of the Cervical plexus. The **Supra-sternal branch** over the inner end, and the **Supra-clavicular** over the middle of the Clavicle. The upper part of the **Supra-acromial branches.**



No. 5.

5. The first **Anterior Cutaneous nerve, artery,** and vein.
6. The **branch of communication** from the Supra-clavicular to the second Anterior Cutaneous nerve. In this case it was with the first, and therefore the junction was seen.
7. By the side of the first Dorsal spine, the **internal branch of the posterior primary division of the first**

Dorsal nerve, with its **corresponding artery** and a radicle of the **Dorsi-spinal veins**.

II. Remove the preceding structures and the fascia lata, and expose—

1. The **Sterno-mastoideus muscle** passing down to the inner third of the Clavicle, only a small portion of the outer border being seen.
2. Below this the **Pectoralis major muscle**, corresponding to the inner half of the same bone.
3. Posteriorly, and also at the outer side of the front aspect, the **Trapezius muscle**.

III.

a. Within the limits of the skin incisions divide and remove the **Pectoralis major muscle** in front, and with it, branches of the **External Anterior Thoracic nerve**.

b. Take away the portion of the **Trapezius muscle** exposed in the dissection. With it will be divided—

1. Branches of the **Superficial Cervical artery and vein**.
2. The **Posterior Jugular vein**.
3. Portions of the **Spinal-accessory**, and **third and fourth Cervical nerves**.

There will now be exposed, passing from before backwards—

1. A further portion of the **inner end of the Clavicle**.
2. Below this the **fascia prolonged from the Pectoralis minor muscle**, and the **Costo-coracoid membrane** and the structures perforating it, viz.:—

 The Acromio-Thoracic artery.

 The Cephalic vein.

 The External Anterior Thoracic nerve.

Perhaps a small branch of the **Superior Thoracic** artery.

3. Above the Clavicle the **third part of the Subclavian** artery.
4. The **Transverse Cervical** branch of the first portion of the same artery is seen higher up, but the **Supra-scapular offset** is hidden by the Clavicle. Both these arteries have **their veins** with them.
5. Above the Subclavian artery are seen the **cords of the Brachial plexus,** and the following branches: The **Supra-scapular, Posterior Thoracic,** and the **nerve to the Subclavius muscle.**
6. Beneath the plexus and the Subclavian artery, the **Scalenus medius and posticus muscles,** the latter most external.
7. Still further back is seen the **upper and inner** angle **of the Scapula,** covered by the **Supra-Spinatus** muscle.
8. Ascending from the Scapula, and running upwards and forwards above the Brachial plexus, the posterior belly of the **Omo-hyoid muscle.**
9. **The first digitation of the Serratus magnus** muscle is seen, internal and posterior to this, above the upper border of the Scapula.
10. Still further back is the **Levator anguli scapulæ muscle** ascending from the angle.
11. Internal to it, and nearer the spine, the upper part of the **Rhomboideus minor muscle.**
12. The upper edge of the **Serratus posticus superior muscle** seen just above the Rhomboideus.
13. The **Posterior Scapular artery,** accompanied by its vein, is seen passing beneath the Levator anguli scapulæ muscle, having previously given a branch over the dorsum Scapulæ. Its continuity with the

Transverse Cervical artery beneath the Omo-hyoid muscle is traceable.

14. The **nerve to the Rhomboid** muscles lies between the Rhomboideus minor and Levator anguli scapulæ muscles, and may be found if they are separated from one another.

IV. The dissection should now be commenced behind, and carried forwards.

a. Remove the exposed part of the **Rhomboideus minor muscle**. The **Serratus posticus superior muscle** is seen beneath it, and the **Posterior Scapular artery and vein** between the two.

b. Remove the **Levator anguli scapulæ muscle** within the limits of the dissection. The **nerve to the Rhomboidei** muscles will be seen beneath it.

c. Take away the exposed part of the **Serratus posticus superior muscle**, and remove at the same time the **Posterior Scapular vessels**, and the **nerve to the Rhomboidei muscles**.

There will now be exposed, passing from the spinous processes outwards—

1. The **tubercle of the first**, and a considerable portion of the **second rib**.
2. The **Splenius muscle** in part, most internally.
3. The **Transversalis colli muscle** in part.
4. The **Cervicalis ascendens muscle** in part, seen passing upwards.
5. The second **Levator costæ muscle** passing from the transverse process of the first Dorsal vertebra downwards and outwards to the second rib, the **external**[1] **branch of the posterior primary division of**

[1] In two dissections I have found this to be the case. Both branches may however, be internal to the Levator costæ muscle.

the **first Dorsal nerve** passing out external to it, and the **internal division** internally.

6. Still more externally the **Scalenus posticus muscle.**

Passing from below are—

7. The upper tendon of the **Musculus accessorius** into the first rib.
8. The highest tendon of the **Longissimus dorsi muscle** when attached to the first rib.

V.

a. Remove the **preceding muscles** as far as they are exposed in the dissection. In detaching the Transversalis colli muscle the **Trachelo-mastoid** will be found beneath it, and should be taken away at the same time. The second Levator costæ muscle may be retained in order to follow out more fully the nerves in relation with it.

There will now be exposed—

A portion of the **Complexus muscle** along the median line.

b. Remove this and there will be seen—

The **Semispinalis muscle.**

c. Take away this and there will come into view—

1. The **Multifidus spinæ muscle.**
2. Lying upon it the **internal branches of the posterior primary divisions of the eighth Cervical and first Dorsal nerves.**

d. Clear away the **Multifidus spinæ muscle,** and there will be seen—

1. The **first rib** at its inner part, the **transverse process of the first Dorsal vertebra,** and part of the **second rib.**
2. The **posterior Costo-transverse ligament,** be-

tween the first Dorsal transverse process and its rib.

3. The posterior part of the **External Intercostal muscle.**

e. Divide the **first Dorsal transverse process** at its root with the chisel. Cut through the **first rib** at its neck, and again external to its tubercle. Cut through the first **anterior Costo-transverse ligament** which runs downwards from the first Dorsal transverse process to the second rib. Remove the included portions of bone. The **posterior and middle Costo-transverse ligaments** of the first rib will be taken away at the same time. The **Superior Intercostal artery,** which lies upon the neck of the first rib, will be divided; but the **Inferior Cervical ganglion of the Sympathetic,** which is internal to it, will not come into view.

f. Remove now the exposed **External Intercostal muscle,** and

The trunk of the **first Dorsal nerve** and its division into anterior and posterior primary branches will come into view.

VI. Continue now the dissection forwards in order to trace out fully the anterior primary branch.

a. Divide and remove the exposed portions of the **Scalenus posticus,** and **Scalenus medius muscles.** The latter muscle is taken away to trace the **branch of the first Dorsal nerve which joins the eighth Cervical.**

b. Cut through the **Clavicle** in two places and remove its middle third with the **Costo-coracoid** membrane and the **Subclavius muscle.**

c. Divide the **Transversalis colli artery** and **vein,** and the **Supra-scapular artery** and **vein.**

d. Cut through the **cords of the Brachial plexus**, and the **Supra-scapular branch.**

e. Remove the **first digitation of the Serratus magnus** muscle, the **fascia over the External Intercostal muscle**, and the remaining portion of the muscle **itself.**

The anterior primary branch of the nerve may now be fully traced.

N.B.—The nerve in the posterior part of its course lies underneath the first rib, and this must be lifted up, or better, the outer border may be chipped away to the necessary extent.

A Dissection of the Posterior Surface of the Cord in the Cervical Region.

Position.—The body lying on its face, the shoulders supported by blocks, and the head hanging forwards.

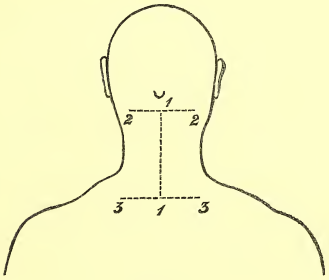
I. Skin Incisions.

1. A vertical one along the middle line, the upper limit of which is the **central point of a line** encircling the neck **at the level** of the apices of the **Mastoid processes**, and the lower the **first Dorsal spinous process.**
2. Transverse incisions above and below for two inches on each side.

Reflect the flaps to the sides and expose the superficial fascia containing—

1. Small cutaneous branches from the **Superficial Cervical artery** on the outer side, and from the **Profunda Cervical** artery with the nerves described under No. 4.

2. **Veins** corresponding to the preceding arteries, and others along the spines connected with the **Dorsi-spinal.**
3. At the outer parts of the surface exposed cutaneous **twigs from the third and fourth Cervical nerves** supplying the skin over the Trapezius muscles.
4. Along the Spinous processes the **inner branches of the posterior primary divisions of the third, fourth, and fifth Cervical nerves,** the third sending a branch up to the Occiput.



No. 6.

II. Remove the **preceding** and the **fascia lata,** and expose—

1. The **Trapezii muscles** running up above to the inner third of the superior curved lines, each attached to all the Cervical spines by means of the **ligamentum nuchæ.**
2. Small portions of the **Sterno-mastoidei muscles** at the extreme upper and outer parts.
3. A small portion of the **Splenius capitis muscle** between the two preceding on either side.

III. Cut through and remove the **Trapezius muscle** on each side as far as it is exposed. With it there will be re-

moved the **Spinal-accessory nerve** and **branches from the third and fourth Cervical nerves**, together with **offsets of the Superficial Cervical artery.**

The following structures will now be seen on both sides:—

1. The **Complexus muscle** highest of all, inserted into the space between the curved lines of the Occipital bone.
2. Below this, the **Splenius muscle**, arising as far as it is possible to make out in this dissection, from the spines of the first Dorsal and the seventh Cervical vertebræ and the ligamentum nuchæ up to the third vertebra, and splitting above into two portions, the upper one of which goes to the head (**S. capitis**), and the lower to the posterior tubercles of the upper three or four Cervical transverse processes (**S. colli**).
3. Below the Splenius the **Rhomboideus minor muscle**, running downwards and outwards from the seventh Cervical and first Dorsal spines.
4. The **Serratus posticus superior muscle** has the same origin as the preceding, and lies beneath it; its superior border showing above it however.
5. The origin of the **Levator anguli scapulæ muscle**, from the upper three or four posterior tubercles of the Cervical transverse processes is seen on the outer side of the Splenius.
6. Between the Levator anguli scapulæ and the Rhomboideus minor, and below the Splenius muscles is a triangular interval, in which some tendinous slips of the **Cervicalis ascendens** and **Transversalis colli muscles** appear, the latter being internal.
7. Lying upon the Complexus muscles at their extreme

upper and outer parts are the **Occipital artery** and **vein**, and lower down on the Splenius muscle branches of the **Superficial Cervical artery** and **vein**, and the **Posterior External Jugular vein**.

8. Lying upon the Complexus above the Splenius muscle, **the internal branches of the posterior primary divisions of the second and third Cervical nerves** and their communications (**Great** and **Third Occipital nerves**).

IV.

a. Detach the **Rhomboideus minor** and the **Serratus posticus superior muscles** of both sides and take them away. The **nerves to the Rhomboid**, and also **those supplying the Serrati** muscles, will be divided.

b. Hook well aside the following muscles of each side:—**Levator anguli scapulæ**, **Cervicalis ascendens**, and **Transversalis colli**.

c. Remove the **Splenii muscles** as far as they are exposed in the space dissected. **Their nerves** from the external branches of the posterior primary divisions of the Cervical nerves will be seen and divided on their deep surface.

There will now be exposed—

1. The **tubercle of the first rib**, internal to the retracted Transversalis and Cervicalis muscles on each side.
2. The **Complexus muscles** lying in the vertebral groove, and reaching above from the Occiput to the lower extremity of the space. The inner division called **Biventer cervicis** is apparent.
3. The **Transversales and Cervicales muscles** of both sides more fully.
4. The **Trachelo-mastoid muscles** on either side, inside

the two immediately preceding muscles, arising from the Cervical articular processes from the fourth to the seventh inclusive, and inserted into the Mastoid processes. All their origin however, is not seen.

5. The **Occipital vessels**, lying upon the Complexus muscle of each side at its extreme upper part, and offsets of the **Princeps Cervicis** branch running down superficial to the muscle.
6. The same **branches of the second and third Cervical nerves** already mentioned.
7. The **nerves to the Splenii** muscles from the posterior primary branches of the Cervical are seen entering their deep surface.

V.

a. Cut through and remove the **Complexus muscles** from their origins and insertions. The former; as is displayed in this dissection is from the transverse processes of the first Dorsal and seventh Cervical vertebræ, the spine of the seventh, and the articular processes of the fourth, fifth, and sixth Cervical vertebræ; the latter; is into the space between the two curved lines of the Occipital bone. The **nerves to the Complexus** from the Suboccipital, and internal branches of the posterior primary divisions of the second and third Cervical nerves, will be divided on removing the muscle.

There will now be exposed—

1. The **articular processes** of the second, third, fourth, fifth, and sixth Cervical vertebræ.
2. The **ligamentum nuchæ** now displayed by the removal of the various muscles.

3. The **Suboccipital triangle**, bounded internally by the **Rectus capitis posticus major** muscle, below and externally by the **Inferior Oblique** muscle, and above and externally by the **Superior Oblique** muscle. In its floor is the **posterior arch of the Atlas.**
4. The **Semispinales** muscles, running from the transverse processes to the spines as high as the second vertebra.
5. Above and external to the processes of the Semispinalis muscle, passing to the second and third spinous processes, is seen a small piece of the **Multifidus spinæ** muscle on either side.
6. Lying upon the arch of the Atlas in the floor of the triangle is seen the **Vertebral artery.**
7. Upon the Semispinales, beneath the nerves to be mentioned, the **Profunda Cervicis branch of the Superior Intercostal artery** running up to join in a general anastomosis over the Suboccipital triangle, with branches of the **Vertebral and Princeps Cervicis** arteries.
8. The origins of the **Vertebral vein**, and sometimes the **Posterior Condyloid vein** in the triangle. The **Profunda Cervicis** vein with the corresponding artery.
9. The **Suboccipital nerve**, and the **internal divisions of the posterior primary branches of the second, third, fourth, and fifth Cervical nerves.** The first, second, and third communicate and form Cruveilhier's plexus. The **Suboccipital nerve** lies *beneath* the **Vertebral artery** *upon* the **arch of the Atlas** and supplies both the Recti postici and Oblique muscles and the Complexus muscle. The **great Occipital nerve** turns round the lower border of the Inferior Oblique

muscle. The **third, fourth, and fifth nerves** course inward *over the* **Semispinalis** to become cutaneous by the Spines; these are seen at their junction with the external branches.

10. The **external branches of the second, third, fourth, fifth, sixth, seventh, and eighth nerves,** emerging externally to the line of the articular processes of the Cervical vertebræ. These enter the following muscles:—Complexus, Transversalis colli, Trachelo-mastoid, and Cervicalis ascendens.
11. **Branches from the Vertebral artery** are seen with the last-mentioned nerves.

VI.

a. Remove now the **Semispinales muscles,** with the **inner branches** of the **posterior primary divisions of the third, fourth, and fifth Cervical nerves** lying upon them.

This brings into view—

1. The **seventh Cervical articular processes.**
2. The **inner branches of the posterior primary divisions of the sixth, seventh, and eighth Cervical nerves.** In the dissection made, the corresponding branch of the fifth nerve passed beneath the Semi-spinalis muscle.

b. Clear away the **Multifidus spinæ,** the **Rectus capitis posticus major** and **minor,** the **Superior** and **Inferior Oblique muscles** of both sides.

c. The **anastomosis** of Vertebral, Princeps, and Profunda Cervicis arteries.

d. The origin of the **Vertebral veins.**

e. **Cruveilhier's plexus** and the nerves forming it.

f. The **inner branches of the posterior primary divisions of the sixth, seventh, and eighth Cervical nerves.**

This will expose—

1. The **laminæ, articular, and spinous processes** of the vertebræ as far as the first Dorsal, and the **posterior arch of the Atlas.**
2. The **posterior Occipito-atloid** and **Atlo-axoid ligaments** and the **Capsular ligaments** of the articular processes.
3. The **Dorsi-spinal venous plexus** lying upon the vertebral laminæ.

VII.

Saw through the **posterior arch of the Atlas,** and the **laminæ** of the exposed vertebræ internal to the articular processes on each side, and remove the pieces of bone together with the following structures:

a. The **Ligamentum nuchæ.**

b. The **Interspinales muscles.** (There are none between the Axis and Atlas.)

c. The **Interspinous ligaments.** (Very slightly marked in the neck.)

d. The **Posterior Occipito-atloid, Atlo-axoid,** and **Ligamenta Subflava** below the first two vertebræ.

e. The **Vertebral artery,** and the **Suboccipital nerve.**

f. The **Venæ Dorsi-spinales.**

This opens up the Spinal canal and exposes—

1. The **Dura-mater** surrounded by loose areolar tissue.
2. The **Posterior Longitudinal venous plexus** lying upon the Dura-mater.

VIII.

Slit up the **Dura-mater,** with the **parietal layer of the Arachnoid** along the median line.

This brings into view—

1. **The visceral layer of Arachnoid** with the Sub-arachnoid space and **Pia-mater.**

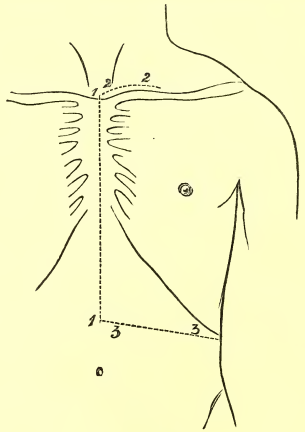
2. The **posterior surface of the Spinal Cord.**
3. The **Posterior Spinal arteries,** one in each side.
4. The **Medulli Spinal veins,** which are in the main two venous trunks, one on each side, united into a close plexus by intercommunicating branches.

A Dissection of the Internal Mammary Artery.

Position.—The body lying supine.

I. Skin Incisions—

1. From the centre of the **supra-sternal notch** to midway between the **umbilicus and Ensiform Cartilage.**



No. 7.

2. A transverse one parallel with and half an inch above the **upper border of the Sternum and Clavicle,**

to the junction of the inner with the middle third of the latter.

3. Another transversely from the lower border of No. 1 to the **tip of the tenth rib.**

Reflect the flap outwards and expose the **superficial fascia** containing—

1. The **Platysma myoides muscle** over the Clavicle.
2. The **Supra-sternal** and **Supra-clavicular nerves** passing over the Clavicle, and branches of the **Supra-scapular artery** with them.
3. The upper eight **Anterior Cutaneous branches of the Intercostal nerves** along the median line. The corresponding vessels from the **Internal Mammary** and **Superior Epigastric** trunks accompanying them.
4. A **communication** between the Supra-clavicular and second Anterior Cutaneous nerves.
5. [1] The anterior branches of the **third, fourth, fifth, and sixth Lateral Cutaneous nerves.**
6. Small **cutaneous vessels** are found in the wall of the abdomen, derived from the anterior portions of the **Intercostals.**

II.

Remove the **Platysma muscle** and the **fascia lata,** and expose—

1. The **Sterno-mastoideus muscle,** arising from the Manubrium Sterni and inner end of the Clavicle.
2. The **Pectoralis major muscle,** arising from the **Clavicle** and the true ribs from the first to the sixth inclusive. The interlaced aponeurosis of the muscles of opposite sides is also seen over the Sternum.
3. The aponeurosis of the **Obliquus Externus muscle,** and

[1] The **second Lateral Cutaneous nerve** usually wants the anterior branch (Ellis). It is, however, figured by Henle.

the fleshy fibres attached to the ninth and tenth ribs.

4. Anterior **branches of the Internal Mammary artery** ramifying over the Sternum.

III.

a. Cut through the exposed attachment of the **Sterno-mastoid muscle** and turn it upwards.

b. Remove the fleshy portion of the **Pectoralis major muscle** within the limits of the skin incisions, preserving the Anterior Cutaneous arteries and nerves, and observing additional **muscular branches of the Internal Mammary artery** in the intercostal spaces from the second to the sixth inclusive.

c. Take away the **anterior layer of the sheath of the Rectus muscle** made up of the aponeuroses of the Obliquus Externus and Internus muscles, and further take away the aponeurosis and exposed fleshy portion of the **Obliquus Externus muscle** external to this.

d. Remove the upper part of the **Rectus muscle**, dissecting out the **Superior Epigastric branch** of the Internal Mammary artery which lies beneath it, with its **vein**. This artery is seen to enter the sheath of the muscle beneath the cartilage of the seventh rib.

There will now be exposed—

1. The inner portion of the **Clavicle**, the side of the **Sternum**, and the **Costal cartilages** as far as the tenth.
2. The **Sterno-hyoid** and **Sterno-thyroid muscles** above the Manubrium and Clavicle.
3. The inner border of the **Scalenus anticus muscle** external to the preceding muscles.

4. The **fascia over the Internal Intercostals**, these muscles showing plainly through it; and the anterior portions of the **External Intercostal muscles.**
5. A portion of the **Obliquus Internus** muscle outside the sheath of the Rectus muscle.
6. The **Anterior Jugular vein** crossing transversely above the Clavicle.

The following structures between the Sterno-thyroid and Scalenus anticus muscles:—

7. A small portion of the **first part of the Subclavian artery** and the following branches. The Thyroid axis, the commencement of its **Inferior Thyroid,** and the **Transverse Cervical** and **Supra-scapular** offsets. The origin of the **Internal Mammary branch** is also seen.
8. The **Phrenic nerve** is seen on the Scalenus anticus muscle if the left artery is dissected; on the right side this nerve is too far out.
9. **The Vagus nerve,** the commencement of its **Recurrent Laryngeal** and **Inferior Cardiac branches,** are to be seen upon the Subclavian Artery, if the right side is dissected; on the left side this nerve is too deep.
10. The **Ansæ Vieusenii** are seen crossing the first part of the right Subclavian artery.

IV.

a. Cut through the **Sterno-hyoid muscle,** and hook inwards the **Sterno-thyroid muscle.**

b. Saw through the **Clavicle** at the junction of the inner with the middle third, and disarticulate the inner end from the Sternum by dividing the **anterior and posterior Sterno-clavicular** and **Interclavicular ligaments.** The **interarticular fibro-cartilage** will be removed, the **Rhomboid ligament,** the inner

end of the **Costo-Coracoid membrane**, and a small piece of the internal portion of the **Subclavius muscle** cut through. Remove the upper and outer projecting **angle of the Manubrium.**

c. Remove the **fascia over the Internal Intercostal** muscles, the anterior portions of the **External** and of the **Internal Intercostal muscles.** When this is done, the **Internal Mammary artery** will be seen in the intervals of the Costal cartilages about half an inch from the Sternum. It will be found to be giving off the **Anterior Intercostal branches** of the upper five or six spaces, two in each space, one running along the upper border of the rib, the other along the lower border of the rib above. These will be found to anastomose behind with the bifurcated Intercostal branches of the Aorta, similarly disposed as regards the rib. In the first or first two spaces, the **Superior Intercostal** artery will take the place of the Aortic Intercostal. In the lower spaces **Anterior Intercostal arteries** will be traced, but they will subsequently be found to arise from the **Musculo-phrenic branch** of the Internal Mammary artery, but this offset in its course outwards and downwards to the ninth cartilage is hidden by the approximation of the seventh, eighth, and ninth cartilages. The **Internal Mammary artery** will be seen to lie upon the pleura above and the **Triangularis sterni muscle** below. The **Intercostal nerves** will also be seen in the spaces crossing superficial to it. **Veins** corresponding to all the arteries mentioned are seen.

d. Having thus traced the artery between the cartilages, now remove the inner portions of the **upper nine** by cutting them through, externally in a line extending obliquely from the **inner end of the** divided **Clavicle** (one and a half inches from the Sternum) to the **tip of the tenth rib**; and internally, disarticulate them from the breast-bone dividing the following: **Anterior and Posterior Costo-sternal, Capsular, Interarticular** of second joint and of third when present, and **Costo-xiphoid** ligaments. The last is between the Ensiform and seventh cartilages. The **synovial membranes** will be of course destroyed.

e. Now raise this portion of the chest-wall from above downwards, dividing on its under surface (1) the slips of the **Triangularis sterni muscle** to the Ensiform, and second, third, fourth, fifth, sixth, and seventh cartilages; (2) the attachments of the **Diaphragm** and **Transversalis** muscle from the sixth to the ninth, and still lower (3) the insertion of the **Obliquus Internus muscle** into the ninth rib, that part attached to the seventh and eighth being already removed. The upper part of the last muscle should now be reflected downwards. This dissection should be done carefully, keeping the knife close to the inner surface of the chest-wall, to avoid a division of the artery.

There will now be exposed, commencing from above—

1. The process of **deep Cervical fascia beneath the Sterno-thyroid** muscle, which should be cleared away.

IF THE DISSECTION IS DONE ON THE LEFT SIDE.

2. The **Internal Jugular** and **Subclavian veins** joining

and forming the **Innominate**, only the beginning of which is exposed. The **Vertebral** and **Internal Mammary veins** will be seen joining the Innominate, and the **Thoracic duct** entering at the junction of the Jugular and Subclavian veins.

3. The lower part of the **Common Carotid artery** beneath the preceding trunks.
4. The **first part of the Subclavian artery**, the **Thyroid axis**, and the commencement of its branches, and the origin of the **Internal Mammary branch.**
5. The **Phrenic nerve** crossing the Internal Mammary artery.

Owing to the veins overlapping the arteries the Vagus nerve is not seen.

IF THE DISSECTION IS MADE ON THE RIGHT SIDE.

2. The **veins** as on the left, but they are more external and separated from the artery by an angular interval. The **right Lymphatic duct** is seen instead of the Thoracic.
3. The bifurcation of the **Innominate artery** into **Subclavian** and **Carotid** branches.
4. The **right Vagus nerve**, its Recurrent and Inferior Cardiac branches.
5. The **Ansæ Vieusenii.**

The Phrenic nerve lies too far out to be displayed on this side.

6. **Lymphatic glands** are seen at the root of the neck above the Manubrium.

IN THE THORACIC REGION.

7. The **parietal Pleura** is seen above, and the **Triangularis sterni muscle** below.
8. The **Diaphragm** is seen below.

9. The **seventh, eighth, and ninth Intercostal nerves** are seen on the portion of the Transversalis muscle remaining, passing behind the Musculo-phrenic branch of the artery.
10. The whole of the **Internal Mammary artery** except the upper part is now seen, and this may be exposed by dividing the **Subclavian vein** and hooking inwards, the Innominate and Internal Jugular veins. This will expose in addition, if the dissection is done on the left side, the **Vagus nerve** and **the Ansæ Vieusenii,** which were not previously seen.

A Dissection to Expose the Anterior Surface of the Trachea.

Position.—Body supine, a block under the shoulders, and the head hanging back.

I. Skin Incisions.

(1.) Along the median line from the **Cricoid cartilage** to the level of the lower border of the **third Costal cartilages** at their junction with the Sternum.

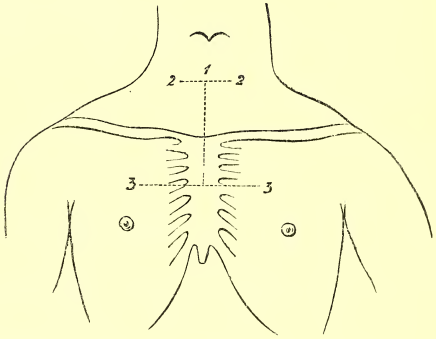
(2.) A transverse incision at the upper end for one inch on either side.

(3.) A transverse incision at the lower end for three inches on either side.

Reflect the flaps outwards and expose—

1. The **superficial fascia.**
2. The **Platysma muscles** over the inner ends of the Clavicles.
3. Branches of the **Anterior Jugular veins** perforating at a variable distance down the neck.

4. The inferior branch of the **Superficial Cervical nerve** at the lower part of the neck.
5. Twigs of the **Supra-sternal** and **Supra-clavicular** branches of the Cervical Plexus.
6. The **communication** of the Supra-clavicular with the second Anterior Cutaneous nerve.
7. Branches of the **Supra-scapular artery** passing over the Clavicle with them.



No. 8.

8. Cutaneous branches from the **Inferior Thyroid artery** at the lower part of the neck.
9. The **first Anterior Cutaneous artery** from the Internal Mammary sending small filaments to join them.
10. The **Anterior Cutaneous arteries, veins, and nerves** of the upper two spaces.
11. The **anterior branch of the second Lateral Cutaneous** nerve, when present.
12. Its **corresponding artery.**

II. Remove all the preceding structures and expose the **fascia lata** of the neck and chest.

In taking away the **Platysma**, the **Supra-clavicular** and **Supra-sternal nerves** will be found *beneath* it above the Clavicle.

III. Remove the **fascia lata.**

In the middle line in front this will be found to present **two layers,** one between the anterior borders of the **Sterno-mastoidei,** and one between the corresponding borders of the **Sterno-hyoidei.** Some fat is found between these layers.

There will now be exposed—

1. The inner portions of the **Clavicles** on either side, and the first two pieces of the **Sternum**; the latter covered by the aponeurotic expansion of the Pectorales muscles.
2. The **Sterno-mastoidei muscles** attached to the Clavicles.
3. The **Sterno-hyoidei muscles.**
4. Small portions of the **Sterno-thyroidei muscles** outside the preceding.
5. Small portions of the **Omo-hyoidei muscles** at the upper and outer parts.
6. Small **branches of the Supra-scapular arteries** over the inner parts of the Clavicles.
7. Small **branches of the Inferior Thyroid arteries** above the Sternal notch.
8. Further portions of the **Anterior Jugular veins,** and a transverse branch of communication between the two, above the Sternal notch.
9. The **Pectorales majores muscles.**
10. **Lymphatics.**

IV. Remove now—

a. The **Sterno-mastoidei muscles** within the limits of the skin incisions.

b. The **Sterno-hyoidei muscles.**

c. The **Sterno-thyroidei muscles.**

In doing this there will be seen immediately beneath the first muscle on each side—

1. A further portion of the **Anterior Jugular vein.**
2. The **nerves to the Sterno-hyoidei** and **Sterno-thyroidei** from the Ansa Hypoglossi entering the outer borders.

d. Cut away the **Pectorales muscles** within the limits of the dissection.

There will now be exposed from above downwards—

1. Processes of **deep Cervical fascia beneath the Sterno-thyroidei** muscles running to the Pericardium.
2. The lobes and isthmus of the **Thyroid body.**
3. The **Trachea** in the median line.
4. The **Œsophagus** at the root of the neck on the left side.
5. The **Inferior Thyroid plexus of veins.**
6. Branches of the **Inferior Thyroid arteries.**
7. The **arteria Thyroidea ima** when present.
8. The inner margins of the **Scaleni antici muscles** on either side.
9. The **Omo-hyoidei muscles,** crossing the Scalenus muscle at the upper part.
10. The **Phrenic nerve** on the left Scalenus anticus.
11. Small portions of the **first part of the Subclavian artery** on both sides with the **Thyroid axis,** and the commencement of the **Inferior Thyroid, Transverse Cervical,** and **Supra-scapular** branches.
12. On the left side, the **Carotid sheath,** and this being opened, the **Internal Jugular vein,** covering this part of the **Common Carotid artery. The Vertebral vein** is also seen.

13. On the right side, the **Common Carotid artery** and **Internal Jugular** and **Vertebral veins** will be both exposed.
14. The **Thoracic** and right **Lymphatic ducts**, and **lymphatic vessels** and glands.
15. The **right Vagus nerve**, between the Carotid artery and Jugular vein, next crossing the Subclavian artery.
16. The right **Ansa Vieusenii**.
17. The **first three ribs, and Costal cartilages.**
18. The inner portions of the **Subclavii muscles**, between the first rib and the Clavicles, covered by the **Costo-coracoid membranes.**
19. The fascia of the **External Intercostales.**
20. The **Internal Intercostales muscles** showing through it.
21. The anterior ends of the **External Intercostales.**
22. The **Anterior Sterno-clavicular** and **Inter-clavicular ligaments**, and **Anterior Costo-sternal ligaments.**

V. Saw through the **Clavicles**, divide the **upper three ribs** at the outer limit of the skin incisions, and saw through the **Sternum** at the lower level of the third cartilages. Remove the included piece of chest-wall, with the following structures—

a. The origins of the **Sterno-hyoidei and Thyroidei muscles.**
b. The **External and Internal Intercostal muscles.**
c. The **Triangulares sterni muscles.**
d. The **Internal Mammary arteries and veins.**
e. The **Intercostal nerves, arteries, and veins of the upper two spaces.**
f. The **Subclavii muscles** will be divided at their inner portions.

g. The **parietal layers of the Pleuræ.**

h. A few **lymphatic glands** between the Pleuræ and Sternum.

The Lungs will be found to be retracted on either side, and there will be now exposed—

1. **Areolar tissue, fat,** and **lymphatics** of the anterior Mediastinum, which should be cleared away.
2. The **Trachea** in the median line.
3. The **right and left Internal Jugular veins,** forming the **right and left Innominates,** and a small portion of the **Superior Vena Cava,** if distended. Entering the right and left Innominates are the **Inferior Thyroid** and **Vertebral veins** coming from above. The **Superior Intercostal veins** from below, and the cut ends of the **Internal Mammary branches.**

These veins should now be removed, and there will then be exposed—

4. The **arch of the Aorta** giving off the **Innominate branch** on the right, which crosses over the Trachea, and bifurcates above into **right Subclavian,** and **Common Carotid** branches. The **left Common Carotid** and **left Subclavian** branches passing upwards and to the left. The **Vertebral artery** will be seen leaving the latter on the removal of its vein.
5. Crossing the arch of the Aorta are, from within outwards—
 a. The **left Phrenic nerve.**
 b. The **Inferior Cardiac branch of the left Vagus.**
 c. The **Cardiac branch of the left superior Cervical ganglion.**
 d. The **left Vagus** giving off its **Recurrent branch.**
 e. The **left Superior Intercostal** vein.

6. The **left Pulmonary artery** and the Ductus Arteriosus.
7. The **right Vagus nerve** passing beneath the **Innominate** artery. Its **Recurrent branch** is seen turning round the Subclavian artery, and its **Inferior Cardiac branch** lying on the outer side, and then passing beneath the Innominate.
8. The **left Vagus** is seen above, between the Common Carotid and Subclavian arteries, and below passing beneath the **left branch** of the **Pulmonary artery.**
9. The **right and left Ansæ Vieusenii** crossing the first parts of the Subclavian arteries.
10. Part of the **superficial Cardiac plexus.**
11. The **right and left Phrenic nerves** in front of the corresponding roots of the Lungs, and the Comes nervi Phrenici arteries with them.
12. The anterior surface of the **Pericardium,** with some small arteries from the Internal Mammary, and small veins running to the left Superior Intercostal and Innominate veins.

VI. Remove now—

a. The isthmus and exposed parts of the lobes of the **Thyroid gland.** In doing this there will be taken away—

1. The **Superior** and **Inferior Thyroid arteries.**
2. The **Middle** and the remaining portions of the **Inferior Thyroid veins.**
3. Branches of **nerves from the middle Cervical ganglion.**

b. Open the **Pericardium.**

c. Divide the **Aorta** between Innominate and left Carotid branches, turn the ends right and left, and fix them.

There will now be exposed—

The whole length of the **Trachea** from its origin to its bifurcation.

And the following additional structures—

1. Further portions of the **Common Carotid arteries** in the neck.
2. The **Œsophagus** more clearly at the root of the neck on the left side.
3. The whole of both **Recurrent Laryngeal nerves.**
4. A further portion of the **Aortic arch.**
5. The **Pulmonary artery** and its bifurcation.
6. The **right Auricle** and **appendix**, the tip of the **left Auricular appendix**, the **Auriculo-ventricular groove**, the upper part of the **right Ventricle**, and the commencement of the **right and left Coronary arteries.**
7. A further portion of the **superficial Cardiac plexus of nerves.**
8. The **deep Cardiac plexus** lying upon the bifurcation of the Trachea, with its radicles entering it from above.

A Dissection to Expose the Vena Azygos Major.

Position.—The body lying on its back.

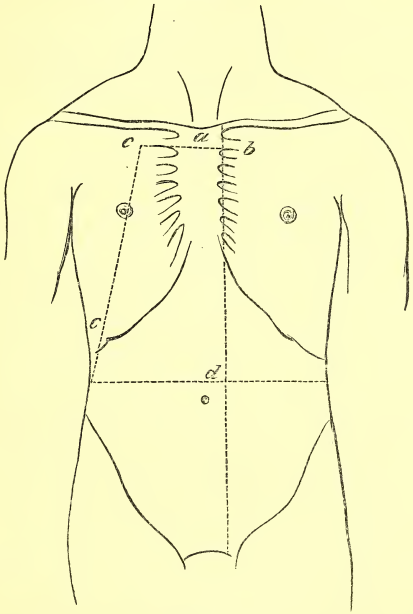
I. The **Thorax**[1] is opened, and the anterior part of its bony wall taken away, with the soft parts attached, by the following dissection—

a. Cut through the **Manubrium** just below the line of junction of the first Costal cartilages with it.

[1] For an account of the structures divided, see the dissections of the Trachea and Internal Mammary arteries.

b. Divide through the junctions of the **left Costal cartilages** with the Sternum, from the second to the seventh inclusive.

c. Cut through the **ribs on the right side,** in a line



No. 9.

leading from a point four inches from the middle line above to the tip of the tenth rib below.

d. Open the **Abdomen** by a crucial incision, the transverse one of which should reach between the tips of the tenth ribs and the vertical to the left of the **Xiphoid** cartilage.

e. Remove the piece of chest wall included between the above incisions, and the right upper flap of the Abdominal wall, cutting through the attachments of the **Diaphragm** to the inner surface of the ribs, the **Round**, and part of the **Suspensory ligaments** of the Liver.

The other flaps are to be turned outwards.

The following parts will be now exposed—

A. In the Chest.

1. **Right Lung** collapsed, and its root.
2. The **Pericardium** in the median line, covered by **areolar tissue**, fat, and **lymphatics**, and the **remains of the Thymus gland.**
3. The process of **deep Cervical fascia** coming from above to the arch of the Aorta and the Pericardium.

Remove the areolar tissue, fascia, and lymphatics, and expose—

4. The **right and left Innominate veins**, their junction, and the commencement of the **Superior Vena Cava.** The **Inferior Thyroid**, the **Superior Intercostal**, the **right Internal Mammary branches** are seen joining their corresponding Innominate trunks.
5. The **arch of the Aorta**, giving off the **Innominate, left Carotid**, and **left Subclavian** trunks.
6. The **right Phrenic nerve** in front of the root of the lung, and the **left Phrenic** crossing the Aortic arch. The **Comes nervi Phrenici artery** with each.
7. On the Pericardium small **arteries** from the Internal Mammary, and **veins** entering the left Innominate trunk.

II.

a. Dissect out the **Vena Azygos major**, as it arches up

and over the root of the right Lung, and enters the Cava; divide the root, and remove the viscus, taking away the **ligamentum latum Pulmonis** at the same time. The following structures will be cut through—

1. **Right Bronchus.**
2. **Right Pulmonary artery.**
3. **Right Pulmonary veins.**

In this order from before backwards, and above downwards.

4. **Right Bronchial artery and veins.**

 At the back of the root.

5. Parts of the **anterior and posterior Pulmonary plexuses of nerves.**

 In front and behind respectively.

6. **Lymphatics and glands.**

b. Hook the divided root well over to the left side, and with it **the Heart**, contained in the Pericardium.

c. Remove the **Pleura**, as it is reflected from the posterior wall of the chest, over the bodies of the vertebræ, to the back of the root of the Lung. The Œsophagus will be found to be drawn to the left by the traction on the root of the Lung and Pericardium.

There will now be exposed—

1. The **Vena Azygos major**, as it lies on the right side of the bodies of the vertebræ; the **right Intercostal veins**, except those of the first two spaces, will be found joining it, the **right Bronchial vein** opens into it near its termination. The **Vena Azygos minor inferior** crosses the body of the seventh or

eighth Dorsal vertebræ to join it, and the **Vena Azygos minor superior** may be found joining the Azygos major above, when present. Both these structures pass beneath the Aorta.

2. The **Thoracic Aorta** is seen lying to the left side of the Azygos major and the **Intercostal arteries**, except those of the first and a part of the second spaces passing behind the vein.
3. The **Thoracic duct** in the interval between the Vein and the Aorta.
4. The **Œsophagus** to the left, with the Vagi nerves in front and behind.
5. The **right gangliated Sympathetic cord** lies externally on the heads of the ribs, giving from the second, third, and fourth ganglia (Quain), or third and fourth (Ellis) branches to the posterior Pulmonary plexus. The ganglia are also seen giving off the **Splanchnic nerves** which run down outside the Vena Azygos. The great Splanchnic arising by roots from the fifth or sixth to the ninth or tenth ganglia inclusive. The small from the tenth or eleventh, and the smallest from the twelfth. These are seen perforating the Diaphragm close to one another. Externally the ganglia are seen to send two branches to each Intercostal nerve.
6. The posterior wall of the chest will be seen formed by the ribs and Intercostal muscles. The **internal muscles as far as the angles, and a thin fascia prolonged inwards to the vertebræ from them.** On removal of this fascia, the **Intercostal nerve, artery, and vein** will be seen having the following relations to each other in the lower spaces, *i.e.* vein, artery, nerve from above downwards; in the upper spaces the

nerve is at first highest. The **External Intercostal muscles** are seen underneath the vessels and nerves extending as far inwards as the tubercles of the ribs.

B. In the Abdomen.

On opening the Abdomen as described above, the following structures are exposed—

1. The **Liver** with the Round and Suspensory ligaments in the middle line, and the tip of the Gall bladder on the right.
2. The **Stomach** on the left.
3. The great **Omentum**.
4. The **Cæcum** and ascending **Colon**, if distended.

III.

a. Raise the **Liver**, and dissect out in the **small Omentum** the **Bile duct** on the right, the **Hepatic artery** and its branches on the left, and the **Portal vein** behind. Divide these structures.

b. Raise the great **Omentum** on to the ribs, and fix it there. Turn the **small Intestine** over to the left, and dissect out the **Superior Mesenteric vessels** as they pass over the third part of the Duodenum.

c. Ligature and divide **the Hepatic flexure of the Colon**, cut through the **conjoined transverse Mesocolon** and great **Omentum** from before backwards, dividing the **middle Colic artery** and **vein**; turn the ends of the Colon right and left.

d. Remove the **Peritoneum** between the Duodenum, and ascending Colon above, and the median line and ascending Colon below, and with it the **Ileo** and **right Colic arteries, veins,** and **nerves,** and

take away the ascending layer of the transverse Meso-colon, in front of the Duodenum and Pancreas.

e. The Stomach is already pulled up, and fixed to the left ribs by the portion of great Omentum remaining. Divide now the **Duodenum** at its junction with the Pylorus, and again below on the right side of the Superior Mesenteric vein. Cut through the **head of the Pancreas**, and take it away with the piece of Duodenum included between the two incisions. The **Pancreatico-duodenalis arteries, superior** and **inferior**, will be divided and taken away, and the **duct of the gland** with the **arteria Pancreatica magna** cut through. The **Bile duct** will be removed, being already cut above. The **Portal vein** must be again divided just after the junction of the Splenic with the Superior Mesenteric, and taken away.

There will now be exposed—

1. The **Abdominal Aorta** and the following branches, the **Phrenics**, the **Cœliac axis**, the **Gastric, Splenic**, the divided **Hepatic** and its **Gastro-duodenal** branch, the right, **Supra-renal, Renal, Spermatic**, and **Lumbar branches.**
2. The **Inferior Vena Cava** on its right side joined by the following veins, **right Phrenic, Supra-renals**, which however may enter the **Renals** (also seen), the right **Spermatic**, the **Lumbar** of both sides, and the **Ascending Lumbar** when present.[1]
3. The right **Crus of the Diaphragm** on the right of the Aorta.

[1] *Vide* Quain, vol. i. p. 473.

4. The **right Psoas muscle**, with the **Genito-crural nerve**, **Spermatic artery**, and **Ureter** lying upon it.
5. The **Kidney**, the upper end concealed by the Liver.
6. The **Solar plexus** and its prolongations along the vessels, viz.:—The **Cœliac, Renal, Supra-renal, Phrenic plexuses.**
7. The **Splanchnic nerves** perforating the right Crus of the Diaphragm. The endings of the small and lesser in the Cœliac and Renal plexuses respectively. The **Semilunar ganglion** and the ending of the greater, are hidden by the Inferior Cava on this side.

IV.

a. Cut through the **Coronary** and **left Lateral ligaments** of the Liver as far as the Inferior Cava.

b. Divide the **Diaphragm** from before backwards, passing between the foramen Quadratum and opening for the Œsophagus down through the decussation of the Crura into the Aortic opening, cutting through the **right Phrenic Artery**; now pull the halves of the Diaphragm to the right and left.

c. Divide the **Inferior Cava** at its entrance into the right Auricle.

d. Pull the Liver and with it the lower portion of the Inferior Cava well over to the right side, and fix it there.

e. Divide the **Supra-renal, Renal,** and **Spermatic arteries.**

f. Pull the upper part of the **Aorta** to the left.

g. Remove the **right Semilunar ganglion**, which will be displayed by the removal of the Inferior Vena Cava, and the right side of the **Solar plexus.**

There will now be exposed—

1. The whole length of the **Vena Azygos Major.**
2. The **right Lumbar Sympathetic cord.**
3. The **Receptaculum chyli** and the **Thoracic duct.**

A Dissection to Expose the Anterior and Posterior Circumflex Arteries.

Position.—The body supported by blocks upon the opposite shoulder to that to be dissected. The arm is to be moved backwards and forwards, and rotated outwards and inwards according as the front or back is being dissected. In making the skin incisions the shoulder is to be drawn well down.

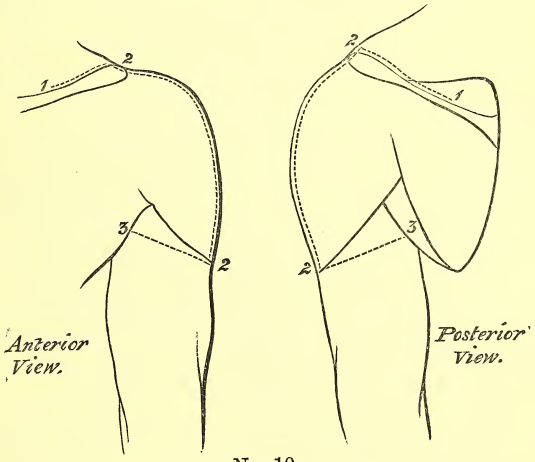
I. Skin Incisions.

1. Along the outer third of the posterior border of the **Clavicle**, the inner border of the **Acromion** process, and the upper border of the **Spine of the Scapula**, for two-thirds of its extent.
2. A vertical incision from the centre of the inner border of the **Acromion** above, over the middle of the prominence of the shoulder to the insertion of the **Deltoid** muscle.
3. From the lower end of No. 2, obliquely upwards and forwards to the middle of the **anterior fold of the Axilla**, and upwards and backwards to the centre of the **posterior fold.**

Reflect the flaps forwards and backwards and expose the **superficial fascia**, and—

1. The upper surface, of the **outer third of the Clavicle**, and of the **Acromion** process.

2. The **anastomosis on the Acromion** between the Supra-scapular, Acromio-thoracic, and Posterior Circumflex arteries.
3. A cutaneous **branch of the Posterior Circumflex artery** at the lower part of the posterior border of the Deltoid muscle, sending a twig downwards to the skin over the long head of the Triceps muscle.



No. 10.

4. A descending branch of the **Acromio-thoracic artery** between the Pectoralis major and the Deltoid muscles.
5. The **Cephalic Vein** also between these two muscles. Its branch of **communication** over the Clavicle with the External Jugular vein may be seen at its upper part.
6. **Lymphatic vessels** along the Cephalic vein.

7. Passing over the Acromion process, the **Supra-acromial branches of the descending cutaneous nerves** of the Cervical plexus.
8. The lower branch of the **Circumflex nerve** passing round the posterior border of the Deltoid below the middle, and supplying the skin over the lower two-thirds of the muscle, and further giving off a twig to the skin over the long head of the Triceps muscle. Offsets of the upper branch of the nerve pass between the muscular fibres, and also turn down over the lower part of the muscle.
9. The **bursa** over the Acromion process.

II. Remove these structures, and the **fascia lata**, and expose—

1. The **Deltoid** muscle forming the prominence of the shoulder.
2. In front of this the outer part and insertion of the **Pectoralis major muscle.**
3. Below the Pectoralis major muscle the **Biceps** muscle is seen at its upper part. The part exposed is mainly the short head, but a small portion of the long head comes into view.
4. Behind the Deltoid muscle the **Latissimus dorsi** and **Teres major** and **minor** muscles are seen in part, and the **Inspinatus** muscle above them covered by its fascia.
5. The upper part of the **external head of the Triceps** muscle is exposed behind the Deltoid muscle at its lower part, running up beneath it.
6. A small twig of the **Dorsalis Scapulæ artery** is seen posteriorly between the Teres muscles.

III. Detach the **Deltoid** muscle from its origin and reflect it downwards. The branches of the Posterior Circumflex

artery and the accompanying nerve to its substance and on its cutaneous surface may be preserved.

There will now be seen—

1. A further portion of the **Acromion**, and the **Coracoid** process of the Scapula. The **head**, and **greater** and **lesser Tuberosities** of the Humerus.
2. The **Coraco-acromial** ligament, and the **Coraco-humeral** portion of the Capsule.
3. The insertions of the **Supra-spinatus**, **Infra-spinatus**, and **Teres minor muscles** from above downwards into the great Tuberosity.
4. A small portion of the insertion of the **Subscapularis muscle** into the lesser Tuberosity, especially seen in the adducted position of the arm.
5. The origin of the **Coraco-brachialis** and short head of the **Biceps muscles** from the Coracoid process, and the tendon of the long head of the latter perforating the Capsular ligament.
6. A further part of the tendon of the **Pectoralis major muscle** passing in front of the Coraco-brachialis and short head of the Biceps muscles, and inserted into the outer Bicipital ridge.
7. A further portion of the **Teres major muscle** is seen behind, covering in this position the Latissimus dorsi muscle.
8. The **long head of the Triceps** muscle is seen posteriorly passing between the Teres major and minor muscles, the former being in front of it. The **Teres major** and **minor muscles** diverge from one another as they pass to the Humerus so as to form a **triangle**, of which the bone forms the base, the Teres minor muscle the upper and internal, and the Teres major muscle the lower and external boundaries. The

long head of the Triceps muscle passing to the Scapula divides this triangle into two parts, an upper or external part **quadrilateral** in shape, and a lower or internal **triangular.**

9. The **Posterior Circumflex artery** and vein, passing through the quadrilateral space.
10. The **Anterior Circumflex artery** with its vein, passing beneath the Coraco-brachialis and Biceps muscles, winding round the neck of the Humerus and anastomosing with the posterior artery.
11. The **Circumflex nerve** accompanying the Posterior Circumflex artery.
12. The **bursa** between the Subscapularis muscle and the Acromion.

IV.

a. Cut through the **Pectoralis major** in front at the point of its appearance from beneath the reflected skin, and turn it outwards.

b. Divide the **Coraco-brachialis and short head of the Biceps muscles,** and turn them downwards. The **Musculo-cutaneous nerve** will be carried with the former muscle.

c. Divide the **long tendon of the Biceps** muscle, and with it the **aponeurotic process from the tendon of the Pectoralis major muscle** to the great Tuberosity. Open up the sheath of the tendon.

d. Remove the fascia and fat and glands from the upper part of the Axillary space, dissecting out the various structures met with.

There will now be exposed—

1. The **Pectoralis minor muscle** in front, attached to the Coracoid process.
2. The **Subscapularis muscle** more fully. It is seen to

hide the Teres minor muscle when looked at from the front, and to take the place of this muscle in the boundaries of the quadrilateral and triangular spaces on the anterior aspect.

3. The insertions of the **Latissimus dorsi** and **Teres major muscles**, the former attached to the floor and the latter to the inner ridge of the Bicipital groove.
4. The upper part of the **internal head of the Triceps muscle** below the Teres major muscle.
5. The **third portion of the Axillary artery**, and its branches—viz., the **Subscapular**, which is seen running downwards on the Subscapular muscle, giving the **Dorsalis Scapulæ** branch through the triangular space. The **Anterior Circumflex** is hidden by the **Median nerve** at its origin, and also by the **Musculo-cutaneous nerve**, but this has been pulled down with the Coraco-brachialis muscle; the artery is seen in all the rest of its course, and a branch running up the Bicipital groove to the joint, may be traced. The **Posterior Circumflex** branch is hidden at its origin by the nerves on the inner side of the artery to be mentioned immediately, and by the Axillary vein, but it may be seen passing backwards through the quadrilateral space. The **Long Thoracic branch** of the second portion of the Axillary trunk may be seen descending along the outer border of the Pectoralis minor muscle. An **External Mammary branch** may be seen sometimes crossing the centre of the space, arising from the third part of the main trunk.
6. The **Axillary vein** is seen internal to the artery, receiving radicles corresponding to the above-named branches of the latter.

7. The **Median** and **Musculo-cutaneous nerves** are outside the artery, the latter gives branches to the Coraco-brachialis muscle before piercing it.
8. The **Internal Cutaneous nerve** is superficial to it.
9. The **Ulnar, inner head of Median,** and **lesser Internal Cutaneous** nerves are internal to the artery.
10. The **Intercosto-humeral nerve** passes out from the second intercostal space lower down, and communicates by a cross branch with the lesser Internal Cutaneous nerve.
11. The **Musculo-spiral** nerve is behind the artery. The origin of its Internal Cutaneous branch is seen.
12. The **Circumflex nerve** is also behind the artery, accompanying the Posterior Circumflex artery.
13. The **Subscapular nerves to the Teres major and Latissimus dorsi muscles** may be seen passing down to their respective muscles.

V.

a. Divide the **Axillary vein,** and turn the ends inwards and outwards.

b. Hook upwards the **Median nerve.** This exposes the origin of the **Anterior Circumflex artery.**

c. Hook downwards the Ulnar, both **Internal Cutaneous** and the **Musculo-spiral nerves.** The origin of the **Posterior Circumflex artery** will now be uncovered.

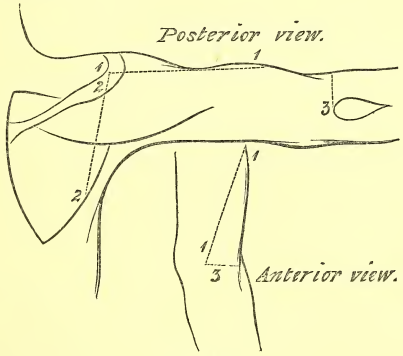
Both the Circumflex arteries may now be seen in their entire distribution.

A Dissection to Expose the Musculo-spiral Nerve.

Position.—The body lying upon its face, the arm extended at right angles to the trunk, and rotated inwards.

I. Skin Incisions.

1. From the tip of the **Acromion** process down the outer border of the arm for about half its extent, and then forwards to the centre of the **bend of the elbow** half an inch below the external **Condyle.**



No. 11.

2. From the upper end of No. 1 downwards and backwards to the centre of the Axillary border of the **Scapula.**
3. From the lower end of No. 1, transversely outwards below the external Condyle to the **Olecranon** process.

Reflect the flap inwards and expose the superficial fascia and the following cutaneous structures—

1. Branches of the **Posterior Circumflex artery**, turning round the posterior border of the Deltoid muscle below the middle, and supplying the skin over it. An offset is also given to the integument over the Triceps muscle.
2. Twigs of the **Superior Profunda artery** in front of and behind the external Condyle.
3. In front of the elbow, the **Median-cephalic vein** joined below by the **Radial**; the **Cephalic vein** is also seen in the lower half of the arm.
4. The **Supra-acromial branches of the Cervical plexus** over the upper part of the Deltoid muscle.
5. Branches of the **Circumflex nerve** turning round the posterior border of the Deltoid at the lower part, and having a similar distribution to the **Posterior Circumflex artery**. Other branches of the nerve perforate the muscle.
6. The **Intercosto-humeral nerve** supplying the skin of the upper half of the inner aspect of the arm; a few filaments passing over the posterior Axillary fold.
7. The posterior branch of the third **Lateral Cutaneous** nerve often reaches the upper part of the arm.
8. The **Internal Cutaneous branch of the Musculo-spiral** nerve passing back beneath the Intercosto-humeral and supplying the skin nearly as far as the Olecranon.
9. The superior **External Cutaneous branch of the Musculo-spiral nerve** lies with the Cephalic vein. The inferior **External Cutaneous** branch over the posterior aspect of the arm.

10. In front of the elbow beneath the Median-cephalic vein, the **Musculo-cutaneous nerve.**
11. The upper part of the **Olecranon bursa.**

II. Remove the preceding and expose the **fascia lata.**

Above the elbow it will be found to form the **external intermuscular septum.** Clear it away except this process.

The following structures will be displayed—

1. The posterior portion of the **Deltoid muscle.**
2. The **Latissimus dorsi muscle** passing beneath it at the lower part, but separated by the long head of the Triceps muscle.
3. The **Teres major muscle,** taking a similar course to the Latissimus, but above it.
4. A small portion of the lower border of the **Teres minor** above the major muscle. It may, however, not come into view.
5. The long head of the **Triceps muscle** below the posterior border of the Deltoid and superficial to the Latissimus dorsi, and Teres major muscles. The outer head of the **Triceps** lower down the arm, and above the long head in the abducted position. Still lower, the outer portion of the inner head and the tendon.
6. In front of the elbow the outer border of the **Biceps muscle,** and beneath it the
7. **Brachialis anticus muscle.**
8. Descending from the external Condyloid ridge the **Supinator longus,** and **Extensor carpi radialis longior muscles.**
9. Still lower down the upper part of the **Anconeus muscle,** behind and below the external Condyle.
10. Between the Brachialis anticus and Supinator longus

muscles a further portion of the **External Cutaneous** nerve will be seen.

11. On pulling outwards the Supinator longus and Extensor carpi radialis longior muscles, the **Musculo-spiral nerve** may be seen perforating the external intermuscular septum, running down beneath them, and dividing at the level of the external Condyle into **Radial** and **Posterior Interosseous branches.** The offsets to these muscles and the Brachialis anticus may also be traced.
12. Running down with the Musculo-spiral nerve the anterior branch of the **Superior Profunda artery** will be seen inosculating below with the **Radial Recurrent branch.**

III.

a. Hook the posterior border of the **Deltoid muscle** well forwards.
b. Cut through the long, and outer heads of the **Triceps muscle.**
c. Divide the **Latissimus dorsi** and **Teres major muscles.**
d. Divide the **Supinator longus** and **Extensor carpi radialis longior muscles.**

There will now be exposed—

1. The head of the **Humerus** and the upper part of the shaft.
2. The **Subscapularis muscle** along the Axillary border of the Scapula.
3. The **Teres minor** muscle parallel with and behind the preceding.
4. Lower down at the elbow the **Supinator brevis** muscle.
5. Most of the second, and all the third part of the **Axillary artery,** and the commencement of the **Bra-**

chial, in front of the Subscapularis and along the inner border of the arm.

6. The **Subscapular branch**, running down the Axillary border of the Scapula, crossing behind the Musculo-spiral nerve, and giving off its **Dorsalis Scapulæ branch** below the Teres minor muscle, this branch then passes beneath the muscle.
7. The **Posterior Circumflex artery** is seen at its origin and in the rest of its course.
8. The origin and upper part of the **Superior Profunda branch of the Brachial artery.**
9. The **Axillary vein**, internal to and in front of its artery, the **venæ comites of the Brachial artery**, and veins corresponding to all the arterial branches above enumerated.
10. The **Circumflex nerve** is seen with the Posterior **Circumflex artery.**
11. The **Musculo-spiral nerve** above and below, and the origin of its Internal Cutaneous branch at its upper part.
12. Deep down in the dissection above, the **Musculo-cutaneous nerve** may be seen entering the Coraco-brachialis muscle and also the **Ulnar nerve**, but it is not necessary to find them, for the nerve in course of dissection is superficial to them in this position.

IV.

a. Remove a portion of the lower border of the **Subscapularis muscle** near the Humerus. Then the **bifurcation of the posterior cord** of the Brachial plexus into the **Circumflex** and **Musculo-spiral nerves** can be seen. This division takes place internal to the Axillary border of the Scapula, and if necessary a portion of the bone may be

chipped away; nevertheless this is not absolutely requisite.

b. Divide the **Subscapular vessels.**

c. Trace the **Musculo-spiral nerve** through the substance of that portion of the Triceps not yet divided, along the Musculo-spiral groove. In this situation the **Superior Profunda artery** will be found lying upon it, and must be removed. The upper part of the external intermuscular septum must also be taken away.

The nerve and its offsets may now be completely traced to its bifurcation. The **Internal branches**, viz., to the inner and middle heads of the Triceps, the Ulnar Collateral, and the Internal Cutaneous. The **Posterior branches**, viz., to the outer head, and the Anconeus muscle; the latter a long slender offset passing through the substance of the muscle with a branch of the Superior Profunda artery. The **External branches**, viz., the two External Cutaneous, and to the Supinator longus and Extensor carpi radialis longior, may all be followed out; some of them, however, have been previously dissected. A branch to the Brachialis anticus muscle from the outer set may be sometimes traced.

A Dissection of the Anastomoses about the Elbow-joint.

Position.—It will be necessary to move the arm about, and it should at first lie on its posterior, and next on its anterior surface.

I. Skin Incisions.

1. A circular one around the arm two inches above the **Condyles** of the Humerus.

2. A circular one around the **forearm**, two inches below the same points.
3. A longitudinal one along the **median line** in front, between the two circular incisions.

Reflect and remove the included portion of skin, and expose the **superficial fascia** containing—

In Front—

1. The **Cutaneous veins.** The **Radial**, on the outer side. The **Anterior** and **Posterior Ulnar**, the latter coming from the posterior surface of the forearm, and the two uniting into one trunk. The **Median**, along the centre of the forearm, dividing into two branches, **Median-cephalic** externally and **Median-basilic** internally, and receiving at its bifurcation a **deep vein** from the venæ comites of the Brachial artery. The Radial vein joins the Median-cephalic, and the two form the **Cephalic vein** which runs up on the outer side of the arm. The united trunk of the Ulnar veins joins the Median-basilic, and the result is the **Basilic vein** passing upwards on the inner side of the arm.
2. With the Cephalic vein is the superior **External Cutaneous** branch of the **Musculo-spiral nerve.**
3. Behind the Median-cephalic vein the **External Cutaneous nerve** running down to the forearm.
4. The **Internal Cutaneous nerve** at the inner side of the arm dividing into numerous branches. One of these passes to the back of the forearm over the internal Condyle; the others pass some superficial to, and some beneath the Median-basilic vein, to the front of the forearm.
5. Cutaneous branches of the **Radial Recurrent artery** are found in front of the outer Condyle.

6. **Lymphatics**, and a **gland** in front of the elbow, and one above the inner Condyle.

BEHIND will be found—

7. The **Olecranon** process covered by a **bursa**.
8. The **nerve of Wrisberg** between the internal Condyle and Olecranon, sending filaments inwards over the lower part of the arm, the inner Condyle, and the Olecranon. A **communication** may be traced with the Internal Cutaneous nerve.
9. The inferior **External Cutaneous branch of the Musculo-spiral** nerve giving twigs over the posterior surface of the arm and forearm.
10. **Cutaneous twigs of the following arteries** are seen: of the **Interosseous Recurrent** behind the outer Condyle; of the **Posterior Ulnar Recurrent** and **Inferior Profunda** behind the inner Condyle.

II. Remove and expose the **fascia lata** which dips down to the external and internal Condyloid ridges to form the corresponding **intermuscular septa**, and is joined in front by the **semilunar process of fascia** derived from the tendon of the Biceps muscle.

III. Remove the preceding except the septa, and there will be now exposed—

IN FRONT—

1. The **Supinator longus** and **Extensor carpi radialis longior muscles** running down from the external Condyloid ridge.
2. The **Brachialis anticus muscle** and the lower part of the fleshy belly and tendon of the **Biceps** muscle in the centre, superficial to the preceding. These pass from the arm, the former to the Coronoid process of the Ulna, the latter to the Tuberosity of the Radius.

3. The origin of the **Pronator radii teres muscle** from the internal Condyloid ridge, and the **common tendon** of the **Pronator radii teres, Palmaris longus, Flexor sublimis digitorum,** and **Flexor carpi ulnaris muscles** from the internal Condyle.
4. A small piece of the **Supinator brevis muscle** in the floor of the triangular space.

Behind—

5. The tendon of the **Triceps muscle** inserted into the Olecranon process.
6. The **Anconeus muscle** passing from the outer Condyle to the outer surface of the Olecranon process.
7. The **common tendon** of the following muscles from the external Condyle: **Extensor carpi radialis brevior, Extensor communis digitorum, Extensor minimi digiti, Extensor carpi ulnaris.** The origin of the **Supinator brevis muscle** from the same bony point.
8. The origin of the **Flexor carpi ulnaris muscle** from the inner surface of the Olecranon process, and the posterior margin of the Ulna.
9. The external and internal **intermuscular septa.**

In Front—

10. A further portion of the **External Cutaneous nerve,** emerging on the outer side between the Biceps and Brachialis anticus muscles.
11. The **Musculo-spiral nerve** lying deeply between the Supinator longus and Brachialis anticus muscles, and dividing on a level with the external Condyle into **Radial** and **Posterior Interosseous branches. Offsets** from the trunk are traceable to the Supinator longus and Extensor carpi radialis longior muscles, and occasionally one supplying the Brachialis an-

ticus muscle. With the nerve a branch of the **Superior Profunda artery** is seen.

12. The **Brachial artery** with its **venæ comites** is seen internal to the Biceps tendon dividing opposite the head of the Radius into **Radial** and **Ulnar branches.** The **Anastomotica Magna branch** is found above the elbow, sending a small branch down beneath the Pronator radii teres muscle, and perforating the internal intermuscular septum.
13. The **Median nerve** lies internal to the Brachial artery, and gives off a branch above the elbow to the Pronator radii teres muscle.

Behind—

14. The **Anastomotica Magna** and **Inferior Profunda arteries** are found in the space between the internal Condyle and Olecranon process.
15. The **Ulnar nerve** with the preceding.

IV. Divide now—

a. The origin of the **Pronator radii teres muscle** from the internal Condyloid ridge, and its inner tendinous head (which overlaps the Anterior Ulnar Recurrent artery) from the inner surface of the Coronoid process.

b. The **common Flexor tendon** from the internal Condyle.

c. The outer head of the **Flexor carpi ulnaris muscle** from the Olecranon process and posterior border of the Ulna.

Turn all the preceding muscles downwards.

d. Detach the **Supinator longus,** and **Extensor carpi radialis longior muscles** from the external Condyloid ridge and pull them down.

e. Remove the **Anconeus muscle.**

f. Take away the **Triceps muscle.** Do this piecemeal, dissecting out in its substance the **Superior Profunda artery.** A branch will be found running to the back of the external Condyle between the muscle and the bone, and an arch across the back of the bone immediately above the Olecranon fossa to the inner side, joining with the **Anastomotica Magna artery.**

There will now be exposed—

In Front of the outer Condyle—

The **Radial Recurrent artery,** joining with the anterior branch of the **Superior Profunda.**

Behind the outer Condyle—

The **Interosseous Recurrent artery anastomosing** with the posterior branch of the **Superior Profunda, and a** branch from the **Anastomotica Magna** coming from the inner side. It sends a branch over the Olecranon to join the Posterior **Ulnar Recurrent artery.**

In Front of the internal Condyle—

A slender branch from the **Anastomotica Magna** artery, uniting with the **Anterior Recurrent** branch of the Ulnar artery.

Behind the internal Condyle—

The general anastomosis of the **Superior** and **Inferior Profunda** and **Anastomotica branches** of the Brachial artery with one another, and with the **Posterior Recurrent** branch of the Ulnar artery running up from the forearm.

A Dissection to Expose the Supinator Brevis Muscle.

Position.—During the dissection the forearm should be pronated and supinated as occasion arises. The muscle will be best displayed with the forearm strongly pronated and resting upon its inner border.

I. Skin Incisions.

1. Transversely from the upper border of the **Olecranon** process of the Ulna outwards over the **external Condyle** of the Humerus to the centre of the **bend of the elbow** in front.
2. Transversely from the posterior border of the **Ulna** at its centre round the outer border of the forearm to the **median line** in front.
3. Join the anterior extremities of the preceding by a longitudinal incision along the median line.

Reflect the flap backwards and outwards, and expose the **superficial fascia** containing—

1. The **Median vein**, its deep **communicating branch** with the venæ comites of the Brachial artery at its point of bifurcation, and the lower part of the **Median-cephalic** branch. The **Radial vein** joining the latter.
2. Cutaneous offsets of the **Radial** and **Interosseous Recurrent arteries** in front of and behind the external Condyle respectively. A transverse branch of the latter is found behind the Olecranon, and cutaneous twigs of the **Superior Profunda** artery behind the external Condyle.
3. A few of the lowest twigs of the superior **External**

Cutaneous branch of **the Musculo-spiral nerve** in front of the elbow, and the inferior **External Cutaneous branch** of the same nerve behind the elbow and the forearm.

4. The **External Cutaneous nerve** beneath the Median-Cephalic vein running down the front of the forearm, giving off its posterior branch at the lower part of the dissection.
5. Part of the **Olecranon** process, and the **external Condyle.** The former covered by its bursa.

II. Remove the preceding cutaneous structures and expose the **fascia lata.** Clean this away, and the following structures will be displayed, commencing from the front and passing backwards—

1. The outer part of the insertion of the **Brachialis anticus muscle.**
2. The tendon of the **Biceps muscle** running down to the Tuberosity of the Radius.
3. The lower part of the **Pronator radii teres muscle** in its whole width below, but only its outer border above.
4. The **Supinator longus muscle** descending from the arm, on the outer side of the forearm. This should be hooked outwards.
5. A small portion of the **Supinator brevis muscle** deep down between the two immediately preceding muscles.
6. The **Extensor carpi radialis longior muscle** outside the Supinator longus muscle.
7. The **common tendon** and upper fleshy portions of the following muscles in their order from without inwards—viz., **Extensor carpi radialis brevior, Extensor communis digitorum, Extensor minimi di-**

giti, **Extensor carpi ulnaris**, and a portion of the origin of the latter from the posterior border of the Ulna.

8. The **Anconeus muscle** running from the outer Condyle to the outer side of the Olecranon.
9. In front, internal to the Biceps tendon, the lower part of the **Brachial artery** and its division into **Radial and Ulnar** branches. The **Radial Recurrent branch** passing up beneath the Supinator longus muscle. These arteries are accompanied by their **veins.**
10. The anterior terminal branch of the **Superior Profunda artery** above, beneath the Supinator longus muscle, anastomosing with the **Radial Recurrent.**
11. The **Median nerve** internal to the Brachial artery, and its **branch to the Pronator radii teres muscle.**
12. Beneath the Supinator longus muscle, but seen by pulling it outwards, the **Musculo-spiral nerve** dividing opposite the external Condyle into **Radial** and **Posterior Interosseous branches.**

III. Divide now—

a. The **Supinator longus and Extensor carpi radialis longior muscles**, and throw the ends upwards and downwards.

b. The **common Extensor tendon**, and pull the fleshy bellies of the muscles taking origin from it downwards. Their **nerves** from the Posterior Interosseous will be cut.

c. The **Pronator teres muscle**, and hook the ends upwards and downwards. The upper portion will carry with it the **Median nerve.**

There will now be exposed—

1. The upper and outer portion of the **Flexor profundus digitorum muscle.**

2. The **Radial artery**, its **Recurrent branch**, and the anterior branch of the **Superior Profunda artery** more fully.
3. Posteriorly, the upper part of the **Posterior Interosseous artery** at its point of emergence below the Supinator brevis muscle. The **Recurrent branch** will be seen passing up upon this muscle and beneath the Anconeus. Sometimes this offset pierces the Supinator brevis.
4. The **Posterior Interosseous nerve**, emerging from the Supinator brevis is seen, giving branches to the Extensor muscles, which however are divided now, and should have been traced when these muscles were reflected.

IV.

a. Remove now the **Radial vessels** and **nerve**, the **Interosseous Recurrent artery**, and the **Posterior Interosseous nerve.**

b. Pull inwards or remove some of the outer fibres of the **Anconeus muscle** which slightly overlap the Supinator brevis muscle.

c. Take away that portion of the **Flexor profundus digitorum muscle** which runs up to the Coronoid process externally to the Brachialis anticus insertion.

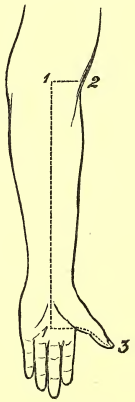
The **Supinator brevis muscle** will now be fully exposed.

A Dissection to Expose the Flexor Longus Pollicis Manus Muscles.

Position.—The forearm supinated, the wrist and thumb extended.

I. Skin Incisions.

1. Longitudinally along the median line, commencing above at the **centre of the forearm** opposite to the head of the Radius, and ending below at the middle of the **palm of the hand** on a level with the upper border of the abducted thumb.



No. 12.[1]

2. Transversely above from the **upper end** of No. 1 to the **outer border of the forearm.**
3. Transversely from the **lower end** of No. 1, along the **inner border** of the **thumb to the tip.**

[1] The dotted line is carried a little too far upwards.

Reflect the flap outwards, and expose the superficial fascia containing—

1. Branches of the **Princeps Pollicis artery** on either side of the thumb.
2. The **Radial vein** along the outer border of the forearm.
3. The **Median vein** along the centre, with the **deep communicating branch** above.
4. The anterior branch of the **External Cutaneous nerve** along the outer border of the forearm.
5. Twigs from the anterior branch of the **Internal cutaneous nerve.**
6. The **Cutaneous Palmar branch of the Median nerve** in the middle line just above the Annular ligament and passing over it into the palm.
7. **Digital branches of the Median nerve** to either side of the thumb.

II. Remove the preceding structures, and expose the **fascia lata.** At the wrist this is seen to be strengthened by transverse fibres, and to constitute in that situation the **Anterior Annular ligament,**[1] being attached internally to the Unciform and Pisiform bones, and externally to the Scaphoid and Os Trapezium. On the palm of the hand is seen the posterior part of the **Palmar fascia,** thick in the centre, but thin over the Thenar eminence.

III. Remove now the **fascia lata,** except that part forming the Anterior Annular ligament. Detach the lateral part of the **Palmar fascia** from the ball of the thumb. There will now be exposed—

1. The **Extensor carpi radialis longior muscle** most externally.
2. Internal to the preceding the **Supinator longus muscle.**

[1] Only the outer part is uncovered.

3. Next the **Pronator radii teres muscle.**
4. Then the **Flexor carpi radialis muscle.**
5. Still more internally the **Palmaris longus**, its tendon passing over the Annular ligament, to be inserted into the Palmar fascia.
6. The **outermost tendon of the Flexor sublimis digitorum** will probably be seen at the lower part.
7. Forming the ball of the thumb are the following muscles: the **Abductor pollicis**, most superficial, running from the lower border of the Annular ligament to the outer side of the base of the proximal Phalanx. The **Opponens muscle** is beneath it, but a small portion is seen at its outer border. The **outer head of the Flexor brevis pollicis** is seen inserted, with the Abductor muscle, into the outer side of the base of the proximal Phalanx. The insertion of the **Adductor** and **inner head of the Flexor brevis pollicis** muscles is seen at the inner side of the base of the proximal Phalanx.
8. Some of the fleshy fibres of the **Flexor longus pollicis muscle** are seen between the tendons of the Supinator longus and Flexor carpi radialis muscles, and its **tendon** emerging from between the two heads of the Flexor brevis pollicis to its insertion into the ungual Phalanx of the thumb.
9. A small piece of the **Pronator quadratus muscle** internal to the **Supinator longus tendon**, on the lower two inches of the Radius.
10. The **Radial artery** is seen to be overlapped above by the Supinator longus, and to be superficial below between the tendon of that muscle and that of the Flexor carpi radialis ~~longior~~. It is found to give off **muscular offsets**, and the **Superficial Volar branch**, over

or between the muscles of the Thenar eminence, and to be accompanied by two **venæ comites.**

11. The **Radial nerve** is seen to lie on the outer side of the artery as far as about three inches above the wrist.
12. A small piece of the **Median nerve** is seen just above the wrist, between the Flexor carpi radialis and outermost Flexor sublimis tendons.

IV.

a. Remove the outer part of the **Anterior Annular ligament,** and take away the central thick portion of the **Palmar fascia** as far as it is exposed, having previously divided the **insertion of the Palmaris longus** muscle into it.

b. Remove the exposed portion of the **Pronator radii teres muscle.**

c. Cut through the **Flexor carpi radialis above** and below, and remove it. Its **nerve** from the Median will be divided.

d. Cut the **Palmaris longus** above and remove it.

There will now be exposed—

1. The outer portion of the **Flexor sublimis digitorum** muscle, its origin from the oblique line and upper three fourths of the anterior border of the Radius; its four tendons passing over the Carpal bones in pairs (the tendons of the middle and ring fingers being in front), and spreading out in the palm to the fingers. The two innermost are not seen.
2. A further portion of the **Flexor longus pollicis muscle** above the wrist.
3. The **Pronator quadratus muscle** more fully.
4. In the palm, the tendons of the **Flexor profundus muscle**[1] beneath those of the Flexor sublimis, and

[1] The two outermost only are seen.

the two outer **Lumbricales** muscles arising from the outer side of those going to the index and middle fingers. These tendons, as well as those of the superficial Flexor muscle, are surrounded by **synovial membrane.**

5. The outer portion of the **Superficial Palmar arch** is seen, and just the commencement of the branch to the contiguous sides of the index and middle fingers.
6. The **Median nerve** is seen in the palm, somewhat enlarged and divided into **two parts.** The **outer division** supplies branches to the **Abductor, Opponens,** and **outer head of Flexor brevis pollicis muscles,** and two **Digital branches** to the outer and inner borders of the **thumb,** and a single branch to the outer side of the **index.** This last branch is only seen at its origin. The commencement of the branch of the **inner division,** which divides for the contiguous sides of the **index** and **middle** fingers, also comes into view. The **twigs to** the exposed **Lumbricales muscles** from the two last-mentioned branches may be traced. The nerves here lie beneath the artery.

V.

a. Divide now the **outer division of the Median nerve,** and the **Superficial Palmar arch.**

b. Clean away the **synovial membrane** from the Flexor tendons.

c. Divide the **Flexor sublimis muscle** longitudinally along its whole length. Cut through the **index and middle tendons,** and reflect the Radial origin of the muscle outwards.

The **Flexor longus pollicis** muscle will now be fully ex-

posed by opening up the Palmar sheath of its tendon; and the occasional slip from the inner part of the Coronoid process of the Ulna may be traced.

In addition there will be seen—

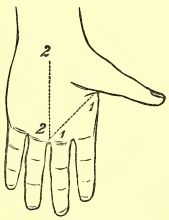
1. The outer part of the **Flexor profundus digitorum muscle** in the forearm.
2. The **Median nerve** in the forearm with its branches to the Flexor sublimis muscle.

A Dissection of the Anterior Surface of the Adductor Pollicis Manus Muscle.

Position.—The hand lying upon its dorsal surface, the thumb strongly abducted and rotated outwards.

I. Skin Incisions.

1. From the inner border of the base of the **proximal Phalanx of the thumb** to the inner border of the **root of the middle finger.**



No. 13.

2. Along the median line from the inner end of the preceding to a point **half an inch in front of the wrist.**

Reflect the flap backwards and expose the **superficial fascia** containing granular fat, and—

1. Cutaneous branches of artery from the **Superficial Palmar arch.**
2. Branches of the **Musculo-cutaneous nerve** over the ball of the thumb.
3. The **Cutaneous Palmar branch** of the **Median nerve** at the centre of the wrist.

II. Remove and expose the central thick, and the outer thin portions of the **Palmar fascia**, and the digitations of the former to the second and third fingers.

III. Remove the preceding and expose—

1. The inner tendon of insertion of the **Flexor brevis pollicis muscle**, and conjoined with it on its inner side the insertion of the **Adductor pollicis muscle.**
2. The tendon of the **Flexor longus pollicis muscle** will be seen on the outer side of the preceding, owing to the retraction of the skin.
3. A small piece of the **Abductor indicis muscle** in front of the Adductor pollicis muscle on the outer side of the index finger.
4. The tendons of the superficial and beneath them of the deep **Flexor muscles** of the fingers to the second and third digits. They are seen passing into their special sheaths, which extend half an inch into the palm. The **Lumbricales** muscles of the index and middle fingers are seen, and on the removal of the superficial Flexor tendons are found to arise each from two tendons of the deep.
5. The **Princeps Pollicis artery** is seen on the thumb, and also its bifurcation.
6. The **Radialis Indicis artery** on the outer side of the index finger.
7. The outer portion of the **Superficial Palmar arch,**

formed by the Superficial part of the Ulnar artery, joining with the Superficialis Volæ branch of the Radial, and a very constant communication with the Radialis Indicis artery. A branch of the arch is seen bifurcating for the contiguous sides of the index and middle fingers.

8. Single **branches of the Median nerve** to the inner side of the thumb and the outer side of the index finger; and one which bifurcates for the contiguous sides of the index and middle digits. The two inner of these branches are found to supply the two outer Lumbrical muscles.

The arteries in the palm are superficial to the nerves.

IV. Remove—

a. The **Superficial Palmar arch** and its branches.

b. The **branches of the Median nerve** to the index and middle fingers.

c. Divide the **Flexor tendons** of the fingers and pull them forwards.

There will now be exposed—

1. The **Adductor pollicis muscle** arising from the anterior two thirds of the Metacarpal bone of the middle finger, and inserted into the inner side of the base of the proximal Phalanx of the thumb.
2. In front of this, the **Abductor indicis muscle** on the outer side of the index finger, and the lower part of the **Palmar and Dorsal Interossei muscles** of the second space; arching over their lower parts the piece of the **Transverse Metacarpal ligament** between the heads of the second and third Metacarpal bones.
3. The inner fleshy head of the **Flexor brevis pollicis**, and its tendinous insertion (often containing a sesa-

moid bone), conjoined with the insertion of the **Adductor pollicis muscle.**

4. A very small piece of the outer part of the **Deep Palmar arch** between the Flexor brevis and Adductor pollicis muscles at their inner parts.
5. The **Deep branch of the Ulnar nerve** supplying the inner head of the Flexor brevis and Adductor pollicis muscles.

A Dissection to Expose the deep Palmar Arch and its Branches.

Position.—The hand lying upon its dorsal aspect with the thumb strongly abducted, and the fingers extended.

I. Skin Incisions.

1. Along the median line of the palm from the line marking **the junction of the wrist with the forearm,** to the centre of the **root of the middle finger.**
2. Transverse incisions from the upper end of No. 1, to the **inner and outer borders of the forearm** respectively.
3. Transverse incisions from the lower end of No. 1, along the roots of the fingers to the **inner and outer borders of the hand.**

Reflect the flaps inwards and outwards, and expose he **superficial fascia,** containing granular fat, and—

1. The **Superficial Transverse ligament** across the roots of the fingers.
2. The **Palmaris brevis muscle,** along the inner border of the hand.

3. The filaments of the **Musculo-cutaneous nerve** over the ball of the thumb.
4. The **Cutaneous Palmar branch of the Median nerve**, passing down over the centre of the Annular ligament and along the centre of the palm, and **communicating** with
5. The **Cutaneous Palmar branch of the Ulnar nerve**, which lies over the Ulnar artery and supplies the skin of the inner border of the hand.
6. Unnamed **twigs of the Median and Ulnar nerves** to the skin of the palm, and **small branches of artery** from the Superficial Palmar arch.

II. Remove the **superficial fascia**, the **cutaneous nerves**, and the **Palmaris brevis muscle**. The branch of **nerve to the muscle** from the Ulnar will be divided.

There will now be exposed—

1. The **Anterior Annular ligament** across the wrist.
2. The **Palmar fascia**. This will be seen to be made up of three divisions, a central thick triangular portion, and two lateral parts covering the Thenar and Hypothenar eminences. The central portion has its apex at the Annular ligament, and its base is cut into four processes, one for each of the fingers. These are connected together by the Superficial Transverse ligament which crosses them at the roots of the fingers.
3. The commencements of the **sheaths of the Flexor tendons** are seen, and these are found to be joined by the Digital processes of the Palmar fascia.
4. The tendon of the **Palmaris longus muscle** is seen passing over the Annular ligament to join the apex of the central triangular division of the Palmar fascia.

5. In the intervals of the four Digital processes of the Palmar fascia, the following structures are seen :—
 a. Small portions of the **Lumbricales muscles** in each space.
 b. The **Digital vessels, and nerves.** Those supplying the outer side of the index and the inner side of the little fingers emerge from the Palmar fascia further back than the others. The nerves are superficial to the arteries at the clefts of the fingers. The origins of the vessels and nerves are not traceable at this stage.
6. The **Ulnar artery and nerve** are found beneath the Palmaris brevis muscle, lying at first upon the Annular ligament, and then passing beneath the Palmar fascia. The nerve is on the Ulnar side of the artery.

III. Remove now the three portions of the **Palmar fascia** and the **Superficial Transverse ligament.** This must be done carefully, so as to avoid cutting the various vessels and nerves, which are now to be traced to their several origins. There will now be exposed—

1. The **small muscles of the thumb.** The **Abductor** most superficial. The outer head of the **Flexor brevis** along its inner border. A small piece of the **Opponens** along its outer border, close to the Annular ligament. A small portion of the **Adductor** running transversely in the cleft between the thumb and index finger, internal to the Flexor brevis pollicis.
2. The **small muscles of the little finger.** The **Abductor** most internal. The **Flexor brevis** along the outer side of the preceding.

3. A small piece of the **Abductor indicis** muscle along the Radial side of the index finger, emerging from beneath the Adductor pollicis muscle.
4. The tendons of the **Flexor sublimis digitorum muscle**, entering their sheaths on the four fingers.
5. The four **Lumbricales muscles**, the first on the Radial side of the index tendon of the Flexor sublimis digitorum muscle, and the others in the intervals between the tendons.
6. The **Superficial Palmar arch** and its **venæ comites** crossing transversely the Flexor tendons on a level with the upper border of the abducted thumb. It is formed for the most part by the **Ulnar artery**, and is completed internally by the **Superficialis Volæ branch of the Radial artery**, and by a **communication with the Radialis Indicis artery**. The first of these two last vessels is usually very small and even inconstant, when present it passes over or through the short muscles of the thumb. From the convexity of the arch, which is directed towards the fingers, the **Digital branches** arise. These are four in number, a single one to the inner side of the little finger, and three others which bifurcate for the contiguous sides of the ring and little, and two next digits. From the concavity of the arch arise **small branches to the palm**, which have been divided. Close to the lower border of the Annular ligament the **Profunda branch of the Ulnar artery** arises, and is seen passing between the Flexor brevis and Abductor minimi digiti muscles.
7. Issuing from beneath the Flexor brevis and Adductor pollicis muscles, and lying upon the Abductor indicis muscle is seen the **Radialis Indicis branch**

of the Radial artery, along the outer side of the first finger. The commencement of the Princeps Pollicis branch of the same artery may be seen just at the cleft of the thumb and index finger.

8. The Ulnar nerve is seen to divide close to the lower border of the Annular ligament into a Superficial and Deep branch. The Deep branch passes, with the corresponding branch of the Ulnar artery, between the Flexor brevis and Abductor minimi digiti muscles. The Superficial branch supplies an undivided offset to the inner side of the little finger, and a bifurcated branch to the contiguous sides of this digit, and the next. This last branch also sends an offset of communication beneath the Ulnar artery to the Median nerve. The branches from the Superficial division of the Ulnar nerve to the Palmaris brevis, and integument of the inner border of the palm are, of course, divided.
9. The Median nerve is seen passing from beneath the lower border of the Annular ligament lying upon the Flexor tendons. Just at this point it is found to be flattened out, and divided into two parts of nearly equal size. From the outer part filaments are traceable to the Abductor, Opponens, and outer head of the Flexor brevis pollicis muscles, and the following Digital branches,—viz., two undivided, one for each border of the thumb, and a third also single, for the Radial border of the index finger. This last also supplies the outermost Lumbrical muscle. The inner division supplies two branches which bifurcate for the contiguous sides of the index and middle, and middle and ring fingers; the outermost of these two supplies the next

Lumbrical muscle, the innermost communicates with **the Ulnar nerve**, as mentioned above.

The branches of the Median nerve lie beneath the Superficial Palmar arch.

IV.

a. Divide now the **Superficial Palmar arch**, both internally and externally, raise the included piece, draw it with the Digital branches toward the fingers, and fix it there.

b. Cut through the **Superficial branch of the Ulnar nerve**, and throw it towards the fingers.

c. Divide the **Median nerve** at the lower border of the Annular ligament, and bring it also over the fingers, cutting through **its branches to the muscles of the thumb and two outer Lumbrical muscles.**

d. Cut through the origin of the **Flexor brevis minimi digiti muscle** from the Annular ligament and Unciform process, and throw it forwards. Its **nerve from the Deep branch of the Ulnar** will be divided.

e. Remove the central portion of the **Anterior Annular ligament** with the portion of the **tendon of the Palmaris longus muscle** which passes over it.

f. Cut through the tendons of the **Flexor sublimis digitorum muscle**, and throw them towards their respective fingers. Beneath the Annular ligament they will be found to be arranged in pairs, the two to the middle and ring fingers being superficial to the other two.

There will now be exposed—

1. **The Adductor minimi digiti muscle**, beneath the Flexor brevis minimi digiti muscle.
2. **The tendons of the Flexor profundus digitorum muscle,**

passing into the Digital sheaths beneath the Flexor sublimis tendons.

3. The **Lumbricales muscles** more fully. The two innermost will be found arising from the contiguous sides of the tendons of the little, ring, and middle fingers. The two outermost from the Radial sides of the tendons of the middle and index fingers respectively.
4. Further portions of the **Profunda branches of the Ulnar artery and nerve.** Two **slender twigs** from this portion of the nerve are traceable to the **two innermost Lumbricales muscles.**

V.

a. Divide the tendons of the **Flexor profundus digitorum muscle,** and throw them towards the fingers with the **Lumbricales muscles** attached. The **nerves** to the two innermost of these latter muscles from the Deep branch of the Ulnar will be torn through.

b. Divide the origin of the **Adductor minimi digiti** from the Unciform process and Annular ligament, and turn the muscle inwards. Its **nerve from the Deep branch of the Ulnar** will be divided.

There will now be exposed—

1. The **Interossei muscles** of the third and fourth spaces, a Palmar and Dorsal in each, the former on the Radial side of the latter. These muscles are **covered by their fascia.**
2. The **Adductor pollicis muscle** more fully, arising from the anterior two thirds of the Metacarpal bone of the middle finger, and passing outwards to the thumb. It hides the Palmar and Dorsal Interossei of the second space, except at their anterior ends.

3. The **inner head of the Flexor brevis pollicis muscle**, arising from the Trapezoid bone, the Os Magnum, the base of the third Metacarpal bone, and the sheath of the Flexor carpi radialis tendon. It passes outwards to the thumb parallel with the upper border of the immediately preceding muscle.
4. The **tendon of the Flexor longus pollicis muscle** between the two heads of the short Flexor.
5. The greater part of **the Deep Palmar arch**, *i.e.*, the Deep branch of the Ulnar artery, is seen to join the Radial.
6. The **Deep branch of the Ulnar nerve** is seen accompanying the corresponding branch of the artery, and ending in **branches to the Adductor pollicis and the inner head of the Flexor brevis pollicis.** Its twig **to the Abductor minimi digiti muscle** may be traced, but those to the **Flexor brevis** and the **Adductor minimi digiti** muscles are divided. **Offsets to all the Interossei muscles** may be found.

VI. To complete the dissection—

Remove the **inner head of the Flexor brevis pollicis muscle** from its origin, and throw it towards the thumb. Its **nerves** will be divided.

This will expose—

1. The upper portions of the **Palmar and Dorsal Interossei** of the second space.
2. A further portion of the **Abductor indicis muscle**, previously covered by the inner head of the Flexor brevis pollicis muscle.
3. The whole of the **Deep Palmar arch**, which will be found to be formed in this way. The **Radial artery** is seen entering the palm at the back of the first interosseous space, between the two heads of origin

of the Abductor indicis muscle. It runs transversely across the palm, lying upon the bases of the Metacarpal bones and the Interossei muscles, above the upper border of the Adductor pollicis muscle; and joins at the inner part the **Deep branch of the Ulnar artery.** It forms an arch about half an inch nearer the wrist than the superficial one. From its concavity **Recurrent branches** are traceable up to the wrist to **join the Anterior Carpal arch.** From its convexity proceed **three arteries** which occupy the three inner interosseous spaces, and run forwards to the clefts of the fingers to join the Digital branches of the superficial arch. From **these Interosseous branches** three **Perforating offsets** to the Interosseous arteries of the back of the hand are traceable.

4. Further portions of the **Radialis Indicis** and Princeps **Pollicis** arteries, previously covered by the inner head of the Flexor brevis pollicis, are displayed.

A Dissection to Expose the Interosseous Artery, its Branches and their Anastomoses.

Position.—Both surfaces of the forearm will be dissected, so that it must be pronated or supinated as occasion arises.

I. Skin Incisions.

1. A circular incision round the arm, at the **level of the external Condyle** of the Humerus.
2. An incision more or less circular, which corre-

sponds in front to the line between the forearm and palm, but posteriorly runs a little lower down along the bases of the Metacarpal bones.

3. A median incision, joining the two preceding above and below, running down the anterior surface of the forearm.

Remove the whole of the skin of the forearm between these limits, and expose the superficial fascia, containing—

In Front—

1. The Median vein, its bifurcation into Median-cephalic and Median-basilic branches, and its junction at the division with the Deep Median branch communicating with the venæ comites of the Brachial artery.
2. The Radial vein commencing below at the back of the forearm, but soon winding round the outer border and joining above the Median-cephalic vein.
3. The Anterior Ulnar vein running up the inner border of the forearm, receiving above the Posterior Ulnar vein, which lower down is placed on the posterior surface, but above winds round to the front to join the Anterior Ulnar vessel. The vein resulting from this junction is seen entering the Median-basilic.
4. The anterior branches of the Internal Cutaneous nerve, some of which usually pass over, and some beneath the Median-basilic vein to supply the skin of the inner border of the forearm as far as the wrist.
5. The anterior branch of the External Cutaneous nerve, usually passing beneath the Median-cephalic vein and supplying the skin of the outer part of the forearm, within the whole limits of the surface exposed.
6. Twigs of the upper External Cutaneous branch of the Musculo-spiral nerve reach the upper and outer

part of the anterior surface of the bend of the elbow.

7. The **Palmar Cutaneous branch of the Median nerve** is seen piercing the fascia about the centre of the forearm just above the wrist.
8. The **Palmar Cutaneous branch of the Ulnar nerve** lies over the line of the Ulnar artery, and pierces the fascia lata just above the wrist. Sometimes a second branch is cutaneous higher up, and joins the anterior branch of the Internal Cutaneous nerve.

BEHIND—

9. The lower portions of the **Radial** and **Posterior Ulnar veins**, as mentioned above.
10. The posterior branch of the **Internal Cutaneous nerve**, supplying about the upper half of the internal portion of the forearm.
11. The posterior branch of the **External Cutaneous nerve** supplying about the lower third of the outer border of the forearm.
12. Twigs of the **lesser Internal Cutaneous nerve**, between the internal Condyle and the Olecranon process, and a **junction** with the posterior branch of the Internal Cutaneous nerve.
13. The lower **External Cutaneous branch of the Musculo-spiral nerve**, supplying the skin of the back of the forearm, between the Internal and External Cutaneous nerves as far as the wrist, and communicating with the latter.
14. The **Radial nerve**, cutaneous between from two to three inches above the wrist, and its points of division into branches for the thumb, the next two, and half the ring fingers.

15. The **Dorsal branch of the Ulnar nerve**, perforating on the inner side at a lower point than the Radial, and its points of division into branches for the remaining finger and a half.

II.

a. Remove the preceding, and expose the **fascia lata**, joined above in front of the bend of the elbow, by the **semilunar process from the tendon of the Biceps muscle.** Behind the wrist it is seen to be strengthened by transverse fibres, and to constitute the **Posterior Annular ligament.**

b. Clear away the deep and Bicipital fascia, and expose—

In Front—

1. Above, the lower part of the **triangular space of the bend of the elbow**, bounded: *externally*, by the **Supinator longus muscle**; *internally*, by the **Pronator radii teres muscle**; and having the *floor* formed by the lower part of the **Brachialis anticus muscle** and a small portion of the **Supinator brevis muscle.** It contains—
2. The **tendon of the Biceps** muscle running down to the Tuberosity of the Radius, most externally.
3. The **Brachial artery**, surrounded by its **venæ comites**, placed internal to the Biceps tendon. The division of the artery into **Radial** and **Ulnar branches** is seen, and the commencement of the **Radial Recurrent branch.**
4. The **Median nerve** is exposed inside the artery, and its **branch to the Pronator radii teres muscle** may be traced.
5. Internal to the Pronator radii teres muscle is seen the **Flexor carpi radialis muscle**, as far as the wrist.

6. The **Palmaris longus muscle**, next internally, and
7. The **Flexor carpi ulnaris muscle**, innermost of all.
8. At the wrist between the tendons of the two preceding muscles, those of the **Flexor sublimis digitorum muscle** come into view.
9. Small portions of the **Pronator quadratus muscle** are seen below on the Radius and Ulna.
10. The **Radial artery** and its **venæ comites** are exposed farther than has been indicated above,—viz., as low down as the wrist. At first it lies in the triangular space, then crosses over the insertion of the Pronator teres muscle, and finally lies between the Supinator longus and Flexor carpi radialis tendons.
11. The **Ulnar artery** with its veins is seen for about its lower third, below and internally, passing from beneath the fleshy portion of the Flexor carpi ulnaris muscle, and running on the outer side of its tendon as far as the wrist.
12. The **Radial nerve** is seen external to its artery, as far as about three inches above the wrist. It is overlapped above by the fleshy part of the Supinator longus muscle.
13. The **Ulnar nerve** lies on the inner side of the lower exposed portion of the corresponding artery, as far as the wrist.
14. A further small portion of the **Median nerve** is seen, just above the wrist, between the Flexor carpi radialis and outermost tendon of the Flexor sublimis digitorum.

BEHIND—

15. The **Anconeus muscle**, passing between the external Condyle, and the outer surfaces of the Olecranon

process and the upper part of the shaft of the Ulna.

The following muscles from without inwards—

16. The **Supinator longus.**
17. The **Extensor carpi radialis longior.**
18. The **Extensor carpi radialis brevior.**
19. The **Extensor communis digitorum.**
20. The **Extensor minimi digiti.**
21. The **Extensor carpi ulnaris.**

At the lower part, passing out between the Extensor communis digitorum and Extensor carpi radialis brevior tendons, are—

22. The **Extensor ossis metacarpi and primi internodii pollicis muscles.**
23. The **Posterior Interosseous artery** is seen on the outer side of the Extensor carpi ulnaris tendon for about the lower third of the forearm, accompanied by its vein.

III.

In Front—

a. Divide the **Pronator radii teres muscle** at its insertion, and at its origin from the Coronoid process, and pull it upwards, cutting through at the same time the **Anterior Ulnar Recurrent artery** and the **Median nerve.**

b. Cut through the tendons of the **Palmaris longus** and **Flexor carpi radialis muscles** at the wrist, and pull these muscles upwards. Their **nerves from the Median** will be divided, and **arterial twigs from the Radial** and **Ulnar.**

There will now be exposed—

1. The **Flexor sublimis digitorum muscle,** its origin above from the internal Condyle, the inner side of the

Olecranon, the oblique line and upper three fourths of the anterior border of the Radius; and its tendons below as far as the wrist.

2. A small portion of the tendon of the **Flexor longus pollicis muscle** below, lying upon the lower part of the Radius.

IV. Divide the fleshy belly of the **Flexor sublimis digitorum** muscle by a longitudinal incision along the middle line, and hook the halves inwards and outwards. The **Median nerve** has already been cut, but **branches from it** to this muscle and **arterial twigs from the Ulnar** will be divided.

There will now be exposed—

1. The **Flexor profundus digitorum** muscle, lying upon the Ulna and the corresponding half of the Interosseous membrane.
2. The **Flexor longus pollicis** muscle, concealing the anterior surface of the Radius and the outer part of the Interosseous membrane. Its occasional head from the inner part of the Coronoid process will be seen if present.
3. A further portion of the **Ulnar artery** is now seen lying upon the Brachialis anticus and Flexor profundus digitorum muscles, and the following branches: the **Anterior** and **Posterior Ulnar Recurrent** branches, the former being cut, the **Common Interosseous** trunk giving off **Anterior and Posterior Interosseous** branches, the former seen passing between the Flexor profundus and longus pollicis muscles, and the latter going to the back of the forearm.
4. All these arteries have **corresponding veins.**
5. The **Median nerve** lying upon the Flexor profundus muscle, accompanied by the
6. **Comes nervi Mediani artery** at the lower part.

V. Separate now the **Flexor longus pollicis muscle** from the **Flexor profundus digitorum muscle**, dissect off their origins from the Interosseous membrane, and pull the former well outwards and the latter inwards. The **occasional head** of origin of the **Flexor longus pollicis** must be cut through if present.

There will now be exposed—

1. The **Interosseous membrane.**
2. The **Pronator quadratus muscle** in the greater part of its extent.
3. The **Anterior Interosseous artery** lying upon the membrane, and disappearing below beneath the Pronator quadratus muscle. Its **twigs to the muscles** between which it lies, the origin of the **Comes nervi Mediani artery**, and the **nutrient arteries** to the Radius and Ulna may now be traced from it. The **Posterior Interosseous artery** may be traced above, passing to the back of the forearm between the Oblique ligament and the upper margin of the Interosseous membrane.
4. The **Anterior Interosseous nerve** is found with the artery of the same name, and its several branches to the Flexor profundus and longus pollicis muscles are traceable, if they have not been torn through in separating these muscles.

VI. To expose the artery beneath the Pronator quadratus muscle, one of two courses may be taken, viz., A or B.

(A) *a.* Separate the tendons of the **Flexor profundus muscle** well from that of the **Flexor longus pollicis muscle** as far as the upper border of the Anterior Annular ligament, and draw them by hooks on either side.

b. Divide the **Pronator quadratus muscle** longitudi-

nally, and reflect the halves inwards and outwards.

In this way there will be exposed—

1. The anterior surface of the wrist-joint and its ligaments.
2. The **Anterior Carpal arch,** derived from the Radial and Ulnar arteries.
3. The **Anterior Interosseous artery** passing to the back of the forearm beneath the Interosseous membrane, but sending down a branch to anastomose with the Anterior Carpal arch.

(B) *a.* Divide the tendons of the **superficial and deep Flexor muscles** of the fingers at the Annular ligament, dissect them up for some distance and hook them inwards.

The same parts enumerated under A will be exposed, but more completely.

The **Anterior Interosseous artery** is now fully exposed except at its ending. To see this, and to trace the Posterior artery, the forearm should now be supinated. The structures exposed by the removal of the fascia lata have been enumerated under Section II.

BEHIND—

VII.

a. Remove the **Posterior Annular ligament.**

b. Separate the **Extensor communis digitorum muscle** from the **Extensor carpi radialis brevior muscle** as high as the external Condyle, cut through its Condyloid origin and reflect the muscle downwards as far as the bases of the Metacarpal bones.

c. Cut through the origin of the **Extensor minimi digiti,** and reflect it down to the same extent.

d. Divide the origin of the **Extensor carpi ulnaris** from the external Condyle and the deep fascia as low down as its attachment to the posterior margin of the Ulna, and hook the muscle inwards. **Branches** of the **Posterior Interosseous nerve** will be cut through in the division of these muscles, together with **twigs from the artery** of the same name.

e. Remove the **Anconeus muscle**, taking care of the artery which will be found beneath it.

There will now be exposed—

1. The posterior surface of the **Supinator brevis** muscle, highest of all.
2. Next below, the **Extensor ossis metacarpi pollicis muscle**, arising from the Radius and Ulna.
3. Next, the **Extensor primi internodii pollicis muscle**, arising from the Radius.
4. Still lower, the **Extensor secundi internodii pollicis muscle**, arising from the Ulna.
5. Lowest of all, the **Extensor indicis muscle**, from the Ulna.
6. The **Posterior Interosseous artery**, passing from the front, between the Supinator brevis and Extensor ossis metacarpi pollicis muscles, and running down the forearm along the outer side of the tendon of the Extensor carpi ulnaris, lying upon the other Extensors of the thumb, and that of the index finger. The **Recurrent branch** uncovered by the removal of the Anconeus muscle is seen passing upwards, lying first upon the Supinator brevis muscle and then upon the Ulna, anastomosing above with the posterior branch of the Superior Profunda artery, and communicating across the Olecranon with the Pos-

terior Ulnar Recurrent artery. The corresponding veins are seen.

7. The **Posterior Interosseous nerve** is displayed, coming through the Supinator brevis muscle, dividing into branches for the Extensor muscles, and disappearing below beneath the Extensor secundi internodii pollicis.

VIII. Divide now the **Extensor secundi internodii pollicis** and **Extensor indicis muscles**. Remove the fleshy portions and pull the tendons outwards. This will expose—

1. The **termination of the Anterior Interosseous artery.**
2. The **Posterior Carpal arch.**
3. The **communication** between the two preceding, and the **branch from the Posterior Interosseous artery, which joins the Anterior,** and the **Carpal arch.**
4. The further portion of the **Posterior Interosseous nerve,** and its gangliform enlargement.

IX. To see the origin of the Posterior Interosseous artery from the common trunk, remove, if necessary, a portion of the lower margin of the Supinator brevis muscle.

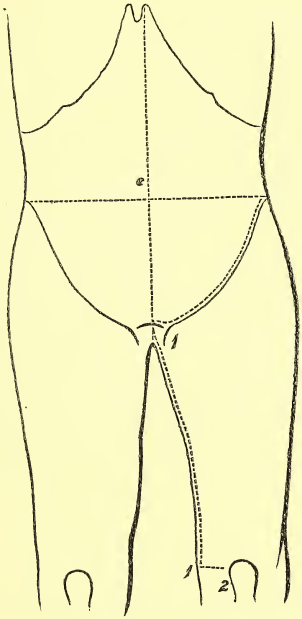
A Dissection to Expose the Obturator Nerve completely.

Position.—The body supine, the thigh of the side dissected to be abducted, rotated out, and slightly flexed.

I. The **Abdomen** is to be opened by a crucial incision, and **the lower flap** on the side to be dissected removed by an incision parallel with and a little above the line of Pou-

part's ligament, then inwards to the median line, the other flaps to be turned outwards and fixed.

In the flap cut away there will be removed the following structures in layers, lettered A, B, C, D, E, F, G, H, K.[1]



No. 14.

A. Skin.

B. **Superficial fascia** in two layers at the lower part.

[1] Paragraphs A, B, C, D, E, F, G, H, K have been printed in smaller type because the anatomy of this flap is not an essential part of the dissection: nevertheless, it is a good plan to mention every structure divided or removed which is visible to the naked eye.

Superficial Pudic artery and vein passing inwards over the cord.

Superficial Epigastric artery and vein passing upwards over the centre of Poupart's ligament.

Superficial Circumflex Iliac artery and vein, sending twigs over the lower part of the Abdomen at the outer part.

Ilio-hypogastric nerve, cutaneous about one inch above the external Abdominal ring.

Ilio-inguinal nerve coming through the ring.

Lymphatic glands along Poupart's ligament.

One or two of the **lower Anterior Cutaneous nerves** accompanied by twigs of the **Deep Epigastric artery.**

The **Spermatic cord** emerging at the ring.

C. The **aponeurosis of the External Oblique muscle,** with the following parts:—

External ring above and outside the spine of the Pubes.

Intercolumnar fibres crossing transversely the lower fibres of the aponeurosis, which run downwards and inwards, and the fascia of the same name covering in the ring.

The **Triangular fascia** belongs to this muscle, but is seen in the next layer as it runs up beneath the inner pillar of the ring to the Linea alba.

The **anterior layer of the sheath of the Rectus muscle** is seen more internally, consisting partly of the aponeurosis of the External Oblique muscle and partly of the next.

D. The **Internal Oblique muscle** in its origin from about the outer half of Poupart's ligament and part of its origin from the crest of the Ilium, and in its insertion to the Linea alba and crest of the Pubes forming the rest of the anterior layer of the sheath of the Rectus muscle as far as half way between the Umbilicus and Pubic crest, but reinforced by the **aponeurosis of the Transversalis muscle** below that point. Above this the aponeurosis splits into two layers, one of which passes in front and one behind the Rectus muscle. The **Conjoined tendon** of this and the next succeeding muscle at its insertion into the Ilio-pectineal line.

The **Cremaster muscle** in front of the cord.

Further portions of the **Ilio-hypogastric and Ilio-inguinal nerves** which lie between the Oblique muscles.

A further portion of the **cord.**

E. The **Transversalis muscle,** in its origin from the outer third of Poupart's ligament, and part of its origin from the Iliac crest, and its insertion into the Linea alba and Pubic crest, forming the rest of the anterior layer of the sheath of the Rectus muscle below the point indicated, but above that extending into the Linea alba behind the muscle.

The **fascia Transversalis** outside the Conjoined tendon and its Infundibuliform process hiding the internal ring.

F. The Rectus and Pyramidalis muscles, the latter in front of the lower part of the former.

G. The **fascia Transversalis.**

The **Deep Epigastric vessels** running up internal to the ring and behind the Rectus muscle, giving off and receiving the Pubic branches.

The **Deep Circumflex Iliac vessels,** running out parallel with Poupart's ligament.

The **obliterated Hypogastric artery,** corresponding in its position with the Epigastric, but on its deep surface.

H. **Subperitoneal fat.**

K. **Peritoneum.**

II. Now dissect the part of the nerve in the thigh.

Skin Incisions.

1. From the **crest of the Pubes** at the centre, down the Symphysis and along the inner part of the thigh to the posterior part of the **internal Condyle** of the Femur.
2. Transversely from the lower end of the preceding to the **fore part of the Condyle.**

Reflect the flap outwards as far as the **line of the Femoral artery.**

This exposes the **superficial fascia** which below Poupart's ligament internal to the Saphenous vein, is found to consist of two layers. At this point it conceals the Saphenous opening, and being perforated by lymphatics is called the **Cribriform fascia.**[1] This fascia contains the following—

1. The **Long Saphenous vein,** running up along the inner and front part of the thigh, and receiving at the upper part the **Superficial Pudic, Epigastric, and Circumflex Iliac branches,** and the **cutaneous veins** of the inner and back part of the thigh united into one trunk, which enters the Saphenous near the opening of that name. Sometimes the veins of the outer part of the thigh unite in a similar manner and join it near the same spot.
2. The cut ends of the **Superficial Pudic, Epigastric, and Circumflex Iliac arteries,** and a cutaneous twig of the **Anastomotica Magna artery** in front of the inner Condyle.
3. The branch of the **Ilio-inguinal nerve** to the skin of the upper and inner third of the thigh.
4. The **Internal Cutaneous nerve** perforating the fascia lata at the junction of the lower with the middle third. **Smaller twigs** of the nerve are cutaneous above this along the Saphenous vein, one or two about the Saphenous opening, and another half-way down.
5. Numerous **lymphatic vessels** in the front of the thigh, and a chain of **glands** along Poupart's ligament.

III. Remove and expose—

1. **Poupart's** and **Gimbernat's ligaments.**
2. The **fascia lata** of the thigh, presenting at the upper

[1] This is the deeper of the two layers.

and inner part, immediately below Poupart's ligament, the **Saphenous opening.**

IV. Clear these structures away and expose—

1. The **Pectineus muscle** at the upper and outer part of the dissection.
2. If this muscle be separated from the next succeeding, the **Adductor brevis** muscle is seen in small part, and lying upon it the three muscular branches of the **Superficial division of the Obturator nerve.**
3. The **Adductor longus muscle** below and internal to the preceding. A **branch of the Superficial division of the Obturator nerve** is found lying along its inner border.
4. The **Gracilis muscle** most internal, descending from the Ramus of the Pubes and flattened against the Adductor muscles.
5. The **Adductor magnus muscle,** the lower fleshy fibres and tendon, below the Adductor longus muscle.
6. The **Sartorius muscle** at the lower part of the thigh, external to the Adductors longus and magnus muscles.
7. A small piece of the **Vastus internus muscle,** external to the Adductors longus and magnus, and overlapped below by the Sartorius muscle.
8. The special **funnel-shaped sheath of the Femoral vessels** is seen above, reaching for two inches below Poupart's ligament. This may now be cleaned away at once, and then the **Femoral artery** with the **vein** internal to it may be seen until they are covered by the Sartorius muscle. The **Inferior External Pudic branch** is seen passing inwards over the Pectineus, and the ending of the **Deep**

branch of the Anastomotica Magna artery lying with the tendon of the Adductor magnus muscle. The vein corresponding to the Inferior Pudic branch is cut inasmuch as it joins the Saphenous.

9. The **Deep Crural arch** will be removed as it crosses the upper part of the Femoral sheath.

V.

a. Divide the **Sartorius muscle** now where it appears beneath the skin at the outer part. The branch of the Obturator nerve which runs along the Adductor longus muscle may now be traced to its junction with the inner branch of the Internal Cutaneous nerve which is now exposed. **The aponeurotic covering of Hunter's Canal** will now be seen, and may be at once removed. When this is done, the **Femoral artery** may be traced to the **opening in the Adductor magnus muscle.** At this point it is seen to give off the **Anastomotica Magna branch.** The **Femoral vein** will be found now lying external to the artery. The **Long Saphenous nerve** will also be seen usually lying externally to the artery, but it may be crossing to the inner side. **A communication** between the inner branch of the Internal Cutaneous and Long Saphenous nerves may now be traced, thus completing the Obturator plexus.

b. Detach the **Pectineus muscle** from its origin and pull it outwards.

c. Cut through the **Adductor longus muscle** at its origin and pull it outwards, taking care of its **nerve** from the Superficial division of the Obturator.

There will now be exposed—

1. The upper part of the **Obturator externus muscle** below the horizontal Ramus of the Pubes.
2. The **Adductor brevis muscle**, below this and overlapping it internally.
3. A further portion of the **Adductor magnus muscle** still lower.
4. The lesser **Trochanter** of the Femur, above the upper border of the Adductor brevis muscle.
5. The portion of the **Profunda Femoral artery** which lies beneath the Adductor longus. Its **Perforating branches** are seen, the first and second piercing the Adductor brevis muscle, the third and the terminal branch of the artery, the Adductor magnus muscle.
6. Branches of the **Internal Circumflex artery**, superficial to the Adductor brevis muscle.
7. The corresponding **veins** with the preceding arteries.
8. The **Superficial division of the Obturator nerve**, running down over the Obturator and Adductor brevis muscles, and sending branches to the Gracilis, Adductor longus and brevis muscles, and the Obturator plexus; all of which are now displayed. A terminal twig to the Femoral artery may also be traced.

VI. Divide the **Adductor brevis muscle** at its insertion. Remove the branches of the **Internal Circumflex vessels** superficial to it. Pull the muscle inwards and fix it. In this way the branches of the Superficial division may be preserved. There will now be exposed—

1. A further portion of the **Adductor magnus muscle.**
2. Other branches of the **Internal Circumflex vessels** beneath the Adductor brevis muscle.
3. The **Deep division of the Obturator nerve may be traced.** Branches may be followed to the Obtu-

rator externus and Adductor magnus muscles, and to the Adductor brevis muscle, when it is not supplied by the Superficial division. A branch may be traced through the fibres of the Adductor magnus muscle to the Popliteal artery by removing a portion of the muscle and pulling internally the **Semimembranosus tendon.** It may in this way be followed to the Posterior ligament of the knee-joint.

VII. THE ABDOMINAL PORTION OF THE DISSECTION SHOULD NOW BE RESUMED.

a. The **great Omentum** and **transverse Colon** should be placed upon the ribs, and the **Intestines** turned to the opposite side of the body on which the dissection is made.

b. Clear away the **Peritoneum** from the brim of the Pelvis, and that over the posterior wall of the Abdomen from near the median line to the right or left Colon, as the case may be.

c. Divide the junction of the **Rectum** with the **Sigmoid flexure,** or the **Ileum** with the **Cæcum,** according to the side dissected.

d. Cut through the **constituents of the cord** at the internal Abdominal ring if this has not already been done, viz., the **Vas Deferens,** the **Spermatic vessels,** and **Sympathetic nerves.** The **artery to the Vas** from the Superior Vesical.

There will now be exposed—

1. The **Psoas magnus muscle,** and **parvus** if present.
2. The **Iliacus muscle** in the Venter Ilii, covered by its fascia.
3. The **Common Iliac artery and its bifurcation,** the upper part of the **Internal,** and the whole of the

External Iliac branch running along the brim of the Pelvis and continuous with the Femoral.

4. The **corresponding veins.**
5. The **Sigmoid branch of the Inferior Mesenteric artery** or the **Ileo-colic of the Superior** will be seen, according to the side dissected, crossing the Psoas muscle, with their veins.
6. The **Ureter and Spermatic vessels** will be found descending over the Psoas muscle.
7. The **Genito-crural** nerve lying upon the Psoas muscle, and traceable below to the Femoral artery and the internal ring.
8. The **Anterior Crural nerve** between the Psoas and Iliacus.
9. The **External Cutaneous nerve** crossing the Iliacus muscle.

VIII.

a. Remove the **Sigmoid** or **Ileo-colic vessels**, as the case may be.

b. Cut through the **External Iliac vessels** at their upper ends, and pull the lower outwards.

c. Separate the **Pelvic fascia** from the brim and upper part of the Pelvic wall. The **Obturator nerve, artery,** and **vein,** in this order, from above downwards, will be found running along the outer wall of the Pelvis to the opening in the Thyroid foramen ; parallel and internal to its upper part will be found the large **cord passing from the fourth to the fifth Lumbar nerves,** and between this and the Obturator the **Ilio-lumbar artery** and **vein.**

d. Pull the **Ureter** inwards, and the **Spermatic vessels** outwards from off the Psoas, and remove the **inner part of this muscle** from its origin as far up-

wards as the lower border of the second Lumbar vertebra downwards to the Pelvic brim.

e. Remove a piece of the **horizontal Ramus of the Pubes**, from just outside the Pubic spine for an inch and a half, opening in this way the canal at the upper part of the Thyroid foramen, dividing and removing a portion of the **Obturator externus muscle** and **membrane.**

There will now be exposed—

1. The origin, course, and distribution of the **Obturator nerve.** The branch from the Superficial division to the hip-joint which comes off near to the Thyroid membrane being now traceable. In the dissection made the Obturator trunk arose from the second, third, and fourth Lumbar nerves.
2. The origin and commencement of the **Anterior Crural nerve.**
3. The bodies of the third, fourth, and fifth **Lumbar vertebræ**, and the intervertebral disc between the second and third.
4. The **Aorta**, and second, third, and fourth **Lumbar arteries.**
5. The **Renal vessels** of the side dissected, at the upper part.
6. Further portions of the **Ilio-lumbar vessels.**
7. The **gangliated cord of the Sympathetic nerve** lying on the side of the vertebræ, and the **communications** between the ganglia and Lumbar nerves.
8. The communication between the fourth and fifth **Lumbar nerves**, and the commencement of the **Lumbo-sacral cord.**
9. The remaining portion of the **Psoas muscle.**
10. The **Iliacus muscle** covered by its **fascia.**

11. Lying upon the Psoas muscle the **Genito-crural**, and upon the Iliacus muscle the **External Cutaneous nerves.**

A Dissection of the Portal Vein, and its Branches.

Position.—The body lying on its back.

I. The Abdomen being opened by a crucial incision, the parts exposed will be—

1. The **Stomach.**
2. The **Liver and Gall-bladder.**
3. The **great Omentum** descending from the Stomach and hiding the small Intestines; frequently, however, it is more or less puckered up, and exposes them to a variable extent.
4. **The Cæcum** and the lower end of the **ascending Colon** when distended.

II. Fix the **Liver** to the ribs by stitches passed through its substance. Pull down the **Pylorus** and dissect out the structures in the lesser **Omentum**, viz.—

1. The **Bile duct** to the right, above joined by the **Cystic** and **Common Hepatic branches.**
2. The **Hepatic artery** to the left, giving off the **Superior Pyloric, Cystic,** and **Gastro-duodenal branches,** the last running down behind the Pylorus, and giving off the **Inferior Pyloric branch.**
3. The **Portal vein** behind the preceding, dividing into right and left branches, and the right receiving the **Cystic vein.** The **Gastric vein** should be traced into it at the Pylorus. The **Gastro-epiploic vein,** running along the greater curva-

ture of the Stomach, may be traced into the Gastro-duodenal by pulling down the Pylorus, and the junction of this with the Portal after being joined by the **Pancreatico-duodenal vein** may be seen.

III. Place the **great Omentum** on the ribs, and dissect out—

1. The **Superior Mesenteric vein** by placing the Intestines over on the left side and removing the **anterior layer of the Mesentery.** The **branches from small Intestines**, the **Ileo-colic**, and **right Colic** branches may be found, and the **middle Colic** by removing the lower layer of the **transverse Meso-colon.**
2. The **Inferior Mesenteric vein**, by placing the Intestines on the right side and removing the Peritoneum covering the left side of the posterior Abdominal wall, whence it passes over the Colon. The **left Colic, Sigmoid**, and beginning of the **Superior Hæmorrhoidal branches** will be seen.

In this dissection the **corresponding arterial branches**, the Superior and Inferior **Mesenteric plexuses of the Sympathetic** nerve and the **Mesenteric glands** will be seen, and the arteries and veins occupying the following relative positions :—

a. **Superior Mesenteric vein** to the right.
b. **Superior Mesenteric artery** to the left of preceding.
c. Next the **Inferior Mesenteric artery.**
d. The **Inferior Mesenteric vein**, most to the left.

IV. Remove any remaining parts of the **posterior layer of the transverse Meso-colon.** Divide a small piece of the **upper end of the Mesentery** opposite the second Lumbar

vertebra, in order to get the beginning of the Jejunum to the right, as it overlaps the upper end of the Inferior Mesenteric vein.

V. Divide the **Hepatic flexure of the Colon**, and, pulling the divided ends to the right and left sides, pin them there.

This exposes—

1. The **Pylorus** and **Duodenum** encircling the **Pancreas.**
2. The **Superior and Inferior Mesenteric arteries and veins** passing over the third piece of the Duodenum and beneath the Pancreatic gland.

VI.

a. Divide now the **head of the Pancreas**, and the **Duodenum** at the junction of its first and second portions. The **arteria Pancreatic Magna** will be divided as well as the **duct.**

b. Pull the **Stomach** and **Pancreas** over to the left, and place them on the ribs.

c. Remove the **Hepatic artery** and **Bile duct.**

The Portal vein and its branches will now be fully seen.

A Dissection of the Posterior Surface of the Kidney.

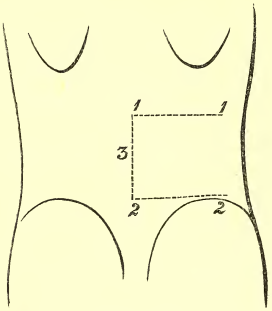
Position.—The body lying upon its face.

I. Skin Incisions.[1]

1. From the spine of the **twelfth Dorsal vertebra**, transversely outwards to the tip of the **last rib.**

[1] It may be objected that these incisions will not uncover a sufficient surface to expose the Kidney. The writer has always proceeded on the principle of the least possible destruction of surround-

2. From the spine of the **fourth Lumbar vertebra** transversely outwards to the **crest of the Ilium**, and along it to a point midway between the anterior and posterior Iliac spines.
3. A longitudinal incision along the median line from the spine of the **twelfth Dorsal** to the **fourth Lumbar vertebra.**



No. 15.

Reflect the flap outwards and expose the **superficial fascia**, containing—

1. The **external branches of the posterior primary divisions of the eleventh and twelfth Dorsal nerves** at the upper part, about one inch from the median line. The branch from the twelfth nerve external to the other.
2. The **posterior branches** of the **Lateral Cutaneous** offsets of the **tenth and the eleventh Dorsal nerves** extending backwards at the anterior and upper part.
3. The **external branches of the posterior primary divi-**

ing parts, compatible with a full view of the structure to be displayed, and he has found from repeated dissections of the Kidney that these incisions are ample.

sions of the first, second, and third Lumbar nerves passing over the crest of the Ilium, the upper ones supplying filaments to the skin over the lower part of the space between the last rib and the crest of the Ilium.

4. Small **cutaneous branches** from the **Intercostal arteries** with the posterior and lateral cutaneous nerves, and from the **Lumbar** arteries with the Lumbar nerves.

II. Remove the preceding and the **fascia lata**, and expose—

The **aponeurosis of the Latissimus dorsi muscle** attached to the Lumbar spines and about the posterior half of the crest of the Ilium. **Fleshy fibres** of the muscle are seen for an inch or more in front of the aponeurotic Iliac attachment of the muscle, and also at the upper part.

III. Cut through the **Latissimus dorsi muscle** at its attachment to the Iliac crest, and again along the upper border of the twelfth rib. Join these transverse cuts by a longitudinal one through the muscle between their outer extremities. Reflect the muscle inwards as far as possible towards the median line behind.

There will now be exposed—.

1. The **Serratus posticus inferior muscle** running from the spines of the last Dorsal and upper two or three Lumbar vertebræ upwards and outwards, and its attachment to the last rib will be seen.
2. The posterior layer of the **aponeurosis of the Transversalis muscle** will be seen below.

These **three aponeurotic structures**, viz., the origins of the Latissimus dorsi and Serratus posticus inferior

muscles, and the posterior lamella of the aponeurosis of the Transversalis are all more or less conjoined with one another at their attachments to the Lumbar spines. The united aponeurosis constitutes the **Fascia lumborum.**

3. The outer edge of the **Fascia lumborum** will be found to be marked by a definite vertical line, which later on is seen to correspond to the external border of the Erector spinæ muscle. Outside this, the fleshy **origin of the Internal Oblique muscle,** from the middle layer of the posterior aponeurosis will be seen.
4. More externally still, the posterior free edge of the **External Oblique muscle** will be seen, extending from the last rib to the Iliac crest, having internal to it the cut edge of the **Latissimus dorsi muscle.**
5. The outer portion of the **last rib** will be seen above, and probably, owing to the retraction of the skin, the lower fibres of the last **External Intercostal muscle.**

IV.

a. Clear away completely the **Lumbar fascia.**

b. Detach the **Internal Oblique muscle** from its origin, and turn it outwards.

There will now be exposed—

1. Nearest to the median line the **Erector spinæ muscle,** dividing above into **Sacro-lumbalis** externally, and **Longissimus dorsi** muscles internally, at about the level of the last rib.
2. Internal to the Longissimus dorsi muscle, from the twelfth Dorsal and upper two Lumbar spines, the **Spinalis dorsi muscle** passing upwards.
3. External to the Erector spinæ muscle, the cut edge of the **posterior layer of the aponeurosis of the Trans-**

versalis muscle. Outside this the middle layer, and, still more externally, the undivided aponeurosis and the fleshy fibres of the muscle.

4. Still more externally, the divided Latissimus dorsi and the External Oblique muscles, as before.
5. Resting upon the upper part of the Erector spinæ the external branches of the posterior primary divisions of the eleventh and twelfth Dorsal nerves, and, piercing its outer border, the corresponding branches of the upper three Lumbar nerves.
6. The anterior branch of the last Dorsal nerve with its accompanying vessels piercing the aponeurosis of the Transversalis muscle at the outer part.

V. The further progress of the dissection will depend upon the width of the Erector spinæ muscle. Usually it will be necessary to remove it, or at least the outer part, but the muscle may be narrow, and then it may be cut transversely at the level of the last rib, and drawn inwards sufficiently. It will be well to proceed as follows:—

a. Make a transverse cut into the upper part of the Erector spinæ muscle, and draw the muscle well inwards towards the spines of the vertebræ.

b. Remove the middle layer of the Transversalis aponeurosis and the fleshy fibres of the muscle by vertical cuts, externally and internally. The last Dorsal vessels and nerve may be dissected out and left.

There will now be exposed, in addition to the structures enumerated under Stage IV.—

1. The tips of the transverse processes of the four upper Lumbar vertebræ.
2. The Quadratus lumborum muscle.
3. Resting upon the posterior surface of the Quadratus

lumborum muscle the anterior branches of the **four Lumbar arteries**, but the lowest may pass in front. With the arteries are the corresponding **veins**.

VI. Take away now the **Quadratus lumborum muscle** completely, with the **vessels** lying upon it. There will now be exposed, in addition to the structures already enumerated—

1. The **anterior layer of the aponeurosis of the Transversalis muscle.**
2. Further portions of the **last Dorsal vessels** and **nerve**; lying immediately below the last rib.

VII. Remove the **anterior lamella** of the **aponeurosis of the Transversalis muscle** and a quantity of **adipose tissue**, and there will be displayed—

1. The **posterior surface of the Kidney.** This organ is very movable, and enveloped by fat. The writer has found as the result of several dissections that, putting for the moment on one side the question of the removal of the Erector spinæ muscle, the Kidney will now fall forwards, and the whole of its posterior surface may be now cleaned and exposed, and that the removal of the eleventh and twelfth ribs is entirely unnecessary.

Besides the Kidney there will be displayed—

2. The **Pelvis of the Kidney** and the commencement of the **Ureter.**
3. The **Colon ascending** or **descending** according to the side dissected. On the left side it lies below and external to the Kidney, on the right more immediately below. **Arteries and veins** from and to the **Superior** or **Inferior Mesenteric vessels**, as the case may be, can also be traced to the Intestine.

4. The **Peritoneum** and **subperitoneal fat** will be seen outside the preceding viscera.
5. Crossing the Kidney transversely from above downwards will be seen—

 The anterior branches of the **last Dorsal vessels** and **nerve**.

 The **Ilio-hypogastric nerve**.

 The **Ilio-inguinal nerve**.
6. Internally the outer part of the **Psoas magnus muscle**.
7. Above, the origin of the **Diaphragm** from the ligamentum Arcuatum externum.

VIII. The dissection has been given from Stage V. on the supposition that the Erector spinæ muscle was sufficiently narrow to allow of its being drawn inwards after making a transverse cut at the upper part. This the writer knows from experience to be the case sometimes. Nevertheless, it more often happens that the muscle is too wide to admit of this mode of treatment, and when this is the case the following correction must be made for Stage V.:—

Remove the **Erector spinæ muscle** as far as it is exposed in the dissection. In addition to the structures already enumerated, there will now be displayed—

1. The **inner** half of the **twelfth rib**, and the **transverse processes** of the four upper Lumbar vertebræ.
2. The attachment to the last rib of the **twelfth Levator costæ** muscle between the tubercle and the angle.
3. The **Multifidus spinæ** muscle, arising from the mammillary processes of the Lumbar vertebræ and passing upwards and inwards to the spinous processes.

4. The posterior **Inter-transverse muscles** between the transverse processes.
5. The **posterior primary division** of the **last Dorsal nerve** and the accompanying **vessels.**

A Dissection to Expose the Posterior Surface of the Sacral Plexus.

Position.—The body lying on the face, the Abdomen and Pelvis raised on blocks, allowing the legs to hang down to a moderate extent.

I. Skin Incisions.

1. An incision running horizontally outwards for four inches from the **median line**, at a level of one inch above the **posterior superior Iliac spine.**
2. From the inner end of (1) along the median line, three-fourths of the distance to the **tip of the Coccyx.**
3. From the lower end of (2) obliquely downwards and outwards to the **Tuber Ischii.**

Reflect the flap outwards and expose—

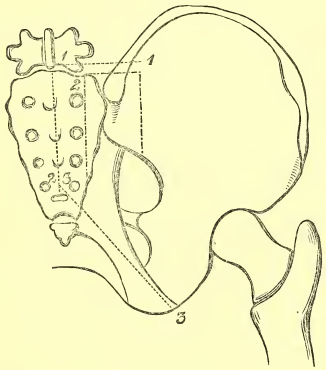
1. The loose areolar tissue of the buttock, and in it,
2. The **external branches of the posterior primary divisions of the upper two Sacral nerves**, the superior near the top of the Sacrum, the inferior at the lower part of the dissection.
2. Accompanying the preceding nerves cutaneous branches of the **Lateral Sacral arteries.**
4. Cutaneous branches of the **Gluteal** and **Sciatic arteries** over the Sacrum, and the **Coccygeal branch** of the latter at the lower part of the bone, also **branches**

of the Gluteal artery perforating the Gluteus maximus muscle.

5. Small filaments of the external branches of the posterior primary divisions of the upper three Lumbar nerves run back over the upper part of the surface exposed.

II. Remove the preceding structures and expose—

1. The conjoined aponeuroses of the Latissimus dorsi and Multifidus spinæ muscles.



No. 16.[1]

2. The fascia lata over the Gluteus maximus muscle.

III. Remove the preceding and expose the Erector and Multifidus spinæ muscles, and the Gluteus maximus muscle.

IV. Detach the preceding muscles, dividing branches of the Gluteal artery and vein to the Gluteus maximus muscle,

[1] The dotted lines (1, 2, 3) indicate the skin incisions, and the others the piece of bone removed.

and noticing branches of the Sacral plexus and Small Sciatic nerve entering its deep surface.

There will now be exposed—

On the Sacrum:

1. The upper three fourths of the posterior surface of this bone and the upper four foramina.
2. The superior and oblique Sacro-iliac and the Supra-spinous ligaments.
3. The posterior primary divisions of the upper four Sacral nerves. The inner branches will be divided on the removal of the Multifidus muscle; the outer branches will be seen to unite in loops on the back of the Sacrum with one another, and a branch running up to the last Lumbar nerve will be seen.
4. The corresponding arteries and veins from and to the Lateral Sacral and Sacra Media vessels.

Under the Gluteus maximus muscle will be seen—

5. The parts of the Sacrum and Ilium from which it arises, the spine of the Ischium, and the upper part of the great Trochanter covered by a bursa.
6. The Great and Small Sacro-sciatic ligaments.

The following muscles from above downwards—

7. The posterior part of the Gluteus medius.
8. The Pyriformis.
9. The Gemelli with the intervening tendon of the Obturator internus muscle.
10. The cut Superficial branch of the Gluteal artery and vein above the Pyriformis.
11. The Sciatic artery and vein below this muscle.
12. The Pudic artery and vein crossing the Ischial spine.
13. A second series of loops of the external branches of

the upper three Sacral nerves lying upon the Great Sacro-sciatic ligament.

14. The Great Sciatic nerve below the Pyriformis.
15. The Small Sciatic nerve, also below this muscle, branches to the Gluteus maximus muscle divided.
16. Branches of the Sacral plexus to the Gluteus maximus muscle, also divided.
17. The nerve to the Obturator internus muscle, usually outside, and the Pudic nerve, inside the Pudic artery.
18. The nerve to the Gemellus superior muscle.
19. The upper part of the nerve to the Gemellus inferior and Quadratus femoris muscles, if the Great Sciatic nerve is pulled outwards.

V.

a. Remove the Gluteus medius muscle from the posterior part of the Iliac attachment.

b. Cut through the Pyriformis muscle as it emerges from the Pelvis, and turn it outwards.

c. Cut through and remove the Sacro-sciatic ligaments.

d. Clear away fat and fascia from the posterior part of the Ischio-rectal fossa.

e. Chisel through the Ilium from the centre of the great Sacro-sciatic foramen vertically upwards to the crest; and through the Sacrum just outside the posterior foramina, as far down as the fourth; connect these incisions above, and remove the included portions of the bones. The incision into the Sacrum should not be carried high enough to remove the upper part of the lateral mass, which is left. All but the upper part of the Sacro-iliac articulation is taken away and with it

The oblique and transverse fasciculi of the **Posterior Sacro-iliac ligaments.**

The **Auricular cartilage.**

The **Anterior Sacro-iliac ligaments.**

f. Remove the pieces of origin of the **Pyriformis muscle**, between the second, third, and fourth Sacral foramina.

g. Take away the loose areolar tissue about the vessels and nerves.

There will now be exposed—

1. The **Lumbo-sacral cord,** } forming the Sacral
2. The first four **Sacral Nerves,** } Plexus.

The following branches of the plexus will be seen—

3. The **Gluteal** from the Lumbo-sacral cord, and first, or first two Sacral nerves.
4. The **Great Sciatic**, a direct continuation of the plexus.
5. The **Small Sciatic** branch arising by two cords from the lower part of the plexus, and traceable to the part formed by the first two Sacral nerves.
6. **Nerves to the Gluteus maximus muscle** from the same part of the plexus as the preceding, in front of it.
7. The **Pudic branch** derived from the third nerve, and involving the whole of the portion of the fourth which joins the plexus.
8. Usually two **branches to the Pyriformis** muscle arising from the upper part of the posterior surface of the plexus, or the first two nerves before they join it.
9. The **nerve to the Obturator internus muscle** will be seen below, but not at its origin from the union of the Lumbo-sacral cord and the first Sacral nerve on the anterior surface. The **nerves to the Gemelli**

muscles will now be seen at their origin from the front and lower part.

10. The **fourth Sacral nerve** is seen perforating and running along the upper part of the Coccygeus muscle.
11. The **Gluteal artery** and **vein** seen between the Lumbo-sacral cord and the first Sacral nerve.
12. The **Sciatic artery** and **vein** below the Sacral plexus.
13. The **Pudic artery** and **vein**.
14. Branches of the **Lateral Sacral arteries** accompany the Sacral nerves.
15. The **Coccygeus muscle** passes from the spine of the Ischium to the Sacrum and Coccyx.
16. A small piece of the **Gluteus minimus muscle** is seen at the margin of the Sacro-sciatic foramen.
17. A small piece of the **Obturator internus muscle** at the outer margin of this foramen.
18. The posterior part of the **Levator ani muscle** where the Ischio-rectal fossa is cleaned.
19. The **Pelvic fascia** is seen beneath the deep surface of the plexus, separating the nerves from the branches of the Internal Iliac artery.

A Dissection to Expose the Anterior Surface of the Sacral Plexus in the Male Subject. The Leg being removed, the Buttock and Perinæum dissected, the Abdomen opened, and the Viscera removed.

Position.—The body lying on its back.

I. The first step will be to make a **side view of the Pelvis**, and to do this the following steps are necessary on the

side on which the section is to be made. The plexus of the opposite side is the one that is to be exposed.

a. Remove the **Psoas muscle** and the **External Iliac vessels** along the brim, and part of the **Iliacus muscle** from the Venter Ilii.

b. Dissect off the **Pelvic fascia** from the brim of the Pelvis. This is to be done carefully keeping close to the bone, and thus taking away the **Obturator internus muscle**, and the dissection should be carried nearly as far forwards as the **Symphysis**, backwards to the **fascia of the Pyriformis**, and as low down as possible.

c. Separate the **Obturator fascia**, with the **falciform process of the Great Sciatic ligament**, and the **Obturator muscle**, from the outer wall of the **Ischio-rectal fossa.** This incision will meet the above.

d. Saw off the **spine of the Ischium.**

e. Saw through the **Rami of the Pubis** and **Ischium**, an inch external to the Symphysis Pubis.

f. Saw through the **Innominate bone** behind, the incision extending from the outer margin of the **Quadratus lumborum** above, vertically downwards to the great **Sacro-sciatic foramen.** Or the bone may be disarticulated behind, by removing the **Multifidus** and **Erector spinæ muscles** from the Sacro-vertebral groove, dividing the **Anterior** and **Posterior Sacro-iliac**, the **Ilio-lumbar**, **Lumbo-sacral**, and **Great Sciatic ligaments**, and forcibly separating the bones. In this way the **Auricular cartilage** which adheres to the Sacrum mostly, may be displayed.

g. When the bone is removed, the **spine of the Ischium**

should be fixed down, and the **Obturator internus muscle** gently peeled off the outer surface of the Pelvic fascia, when the following will be exposed—

1. The **Pelvic fascia**, and **white line** extending from the lower part of the Symphysis to the Ischial spine.
2. The **Obturator fascia** below this line.
3. The **Obturator nerve, artery,** and **vein,** running transversely above, in this order from above downwards, and passing out in front through the opening above the Obturator membrane. They lie in the substance of the Pelvic fascia.

The **Pudic vessels,** and **nerve,** are seen lying in the substance of the Obturator fascia, or rather in a sheath derived from its inner surface. They may be traced backwards round the Ischial spine, and as far forwards as the **Triangular ligament.**[1]

II. Remove now the **Obturator fascia** at the white line. Divide the **Anal fascia** along this line; cut through the origin of the **Levator ani muscle** from it, and expose the **Recto-vesical fascia**[2] running downwards and inwards to

[1] A good dissection of the Pudic artery may be made in this way, but the anterior section of the bone would have to be modified.

[2] The above is the account of the arrangement of the Pelvic fascia as usually given. It is, however, frequently found, that the Pelvic fascia is directly continuous with the Recto-vesical, and the white line is formed by the upper edge of the Obturator, which is loosely connected with the Pelvic by areolar tissue. The origin of the Levator ani muscle often extends considerably above the white line.

the viscera. Below it are the following parts closing the Pelvic outlet from before backwards:—

1. The **Triangular ligament.**
2. The **Levator ani muscle.**
3. The **Coccygeus muscle,** and the smaller **Sacro-sciatic ligament.**
4. The **Great and Small Sciatic nerves,** the **Pudic nerve,** the **nerve to the Obturator internus muscle.**
5. The **Sciatic vessels,** piercing the fascia of the Pyriformis.

The preceding vessels and nerves leave the Pelvis below the Pyriformis muscle.

6. The **Pyriformis muscle.**
7. The **Sacral plexus** lying upon it, and giving off the above-named branches.
8. The **Gluteal vessels** and **nerve,** above the Pyriformis muscle, and piercing the fascia over it.

III.

a. Cut away the **Recto-vesical fascia** and its prolongations to the viscera on the side of the Pelvic section, the **Pubo-prostatic ligament,** and Ellis's **ligament of the Rectum.**

b. Remove the piece of **Peritoneum passing to the viscera** from the side of the Pelvis on which the section has been made, and display in this way a side view of the Pelvic viscera.[1]

The following are the parts now seen—

1. The divided portions of the **Innominate bone.**
2. **The Rectum** in the concavity of the Sacrum and Coccyx; most posteriorly branches of the **Superior Hæmorrhoidal artery** may be seen in removing the

[1] To show the parts more clearly, the Bladder should be inflated through the Ureter, and the Rectum filled with tow.

sheath of Recto-vesical fascia. Owing to the curvature of this viscus to the left, a better view is obtained by making the section on this side.

3. The **Bladder** in front of the preceding.
4. The **Recto-vesical pouch** of Peritoneum between the Bladder and Rectum.
5. The **Prostate gland** surrounding the neck of the Bladder, and enveloped by the **Prostatic plexus** of veins, the sheath of the Recto-vesical fascia being removed.
6. In front of the preceding the **two layers of the Triangular ligament** perforated by the **Membranous Urethra**, and in front of the ligament the **Bulb.**
7. Between the Fundus of the Bladder and the Rectum the **Vesicula Seminalis** of the side dissected.
8. The **Ureter** is seen descending internally to the Internal Iliac vessels, and entering the posterior and external part of the Fundus of the Bladder.
9. The **obliterated Hypogastric artery** is seen running transversely on the upper part of the side of the Bladder to the apex, and continuous behind with the **Internal Iliac artery.**
10. Crossing over the immediately preceding structure, and running vertically down internally to it and the Ureter, is the **Vas Deferens,** accompanied by its **artery.**
11. Extending from the apex of the Bladder on to the Abdominal wall are the **Urachus,** and both **obliterated Hypogastric arteries.**
12. Extending from the Abdomen over the Sacro-iliac Synchondrosis the **Internal Iliac artery.** Its **Obturator, Sciatic,** and **Pudic branches** are divided, as well as the **Gluteal,** but the **Superior, Middle, and**

Inferior Vesical offsets are seen, the former giving the branch to the Vas, and the Middle very inconstant. The **Middle Hæmorrhoidal artery** is also displayed, commonly arising from the Inferior Vesical or the Pudic branches.

13. The **corresponding veins.** These are plexiform at their origin, and form the **Prostatic, Vesical,** and **Hæmorrhoidal plexuses,** which are found on the sides of the corresponding viscera. The **Dorsal vein of the Penis** is seen entering the Prostatic plexus.
14. The **Pelvic plexus of the Sympathetic nerve** of the side dissected is seen surrounding the Iliac vessels, and sending prolongations to the viscera along the vessels.
15. **Lymphatic glands** along the Iliac vessels.
16. Below these structures are seen the **parts closing the outlet** of the Pelvis already enumerated above.

IV.

Divide now the following structures—

a. The **Spermatic cord** at the internal Abdominal ring of the side on which the section has been made.

b. The **obliterated Hypogastric artery.**

c. The **Ureter.**

d. The **Vesical** and **Middle Hæmorrhoidal arteries** and **veins** of the side dissected.

e. Cut through the **Meso-rectum,** containing the **Superior Hæmorrhoidal artery** and vein, and the accompanying **Sympathetic plexus,** and draw the **Rectum** well over to the side from which the bone has been removed.

f. Strip off the **Peritoneum** passing from the Blad-

der and Rectum to the opposite side of the Pelvis.

g. Divide the **obliterated Hypogastric artery**, the **Spermatic cord**, the **Vesical** and **Hæmorrhoidal vessels**, and the **Ureter** of the opposite side.

h. Cut through the **Recto-vesical fascia** of the opposite side at its visceral attachments, and pull the Bladder over to the same side as the Rectum.

i. Dissect out the **Internal Iliac vessels** and their **branches**, and remove them; except the **Obturator**, which may remain on the Pelvic wall. These branches have already been enumerated. In cleaning these the other **Pelvic Sympathetic plexus** will be destroyed.

j. Remove the fascia of the Pyriformis.

There will now be exposed—

1. The anterior surfaces of the **Sacrum** and the **Coccyx** and the posterior surface of the **Symphysis Pubis**.
2. Lying on the Sacrum, the **Sacra Media** and **Lateral Sacral arteries** and **veins**. The **Hypogastric Sympathetic plexus**, and the **gangliated cords of the Sympathetic**, one on each side, are seen uniting below in the **ganglion impar**. **The Coccygeal gland** may be found below this, receiving branches from the **ganglion impar** and the **Sacra Media artery**.
3. The **Psoas muscle**, **External Iliac vessels**, and **Pelvic wall** of the opposite side, and covering the wall:—
4. The **Pelvic fascia** lining the Obturator internus muscle; below is the **white line**, and below this the **Recto-vesical fascia** covering the Levator ani muscle. The Recto-vesical fascia may be seen closing the Pelvis in front, leaving in the median line a little **triangular interval** between the Pubic

attachments of the Levatores ani; here it is very thin, and dips down to join the Prostatic capsule. This *fascia is seen to be separated from the Triangular ligament by the Levatores ani muscles.*

5. The **Obturator nerve, artery,** and **vein** are seen running across the Pelvic wall in this order from above downwards. Behind the Symphysis are the **Pubic** branches of the **Obturator,** and **Deep Epigastric arteries.**
6. The **Coccygeus muscle** behind the Levator ani muscle, passing from the sides of the Sacrum and Coccyx to the Ischial spine.
7. The **Sacral plexus** consisting of the Lumbo-sacral cord, and the first, second, third, and part of the fourth nerves, their **communications** with the Sympathetic ganglia and the following branches. The **Gluteal,** arising from the posterior part of the Lumbo-sacral cord, and the first or first two Sacral nerves. The **nerve to the Obturator internus muscle** derived from the front of the plexus at the union of the Lumbo-sacral cord, with the first Sacral nerve. **Visceral branches** to the Bladder and Vagina, from the second, third, and fourth nerves (Godlee). Ellis describes them as coming from the fourth nerve, and sometimes from the third. In this dissection they came from the second, third, and fourth.
8. The remainder of **the fourth nerve,** its **Hæmorrhoidal** branch, which is seen passing over the Coccygeus muscle and turning to the back of the Coccyx, between that muscle and the Levator ani, or perforating the former. The **branch** to the visceral surface of the **Levator ani muscle,** which also sup-

plies the **Coccygeus.** This is internal to the preceding, and is seen by dissecting off the Recto-vesical fascia from the Levator ani muscle.

9. The nerve formed by the **united anterior primary branches** of **the fourth, fifth,** and the **Coccygeal,** perforating the Coccygeus muscle to be distributed to its posterior surface.

A Dissection to Expose the Pudic Artery.

Position.—The body in the lithotomy position, but the buttocks raised higher than usual by blocks beneath the Lumbar region. The side on which the dissection is to be made tilted higher than the opposite. The Scrotum should be hooked forwards on to the Abdomen. In this way, the side of the buttock, the Ischio-rectal fossa, and the Perinæum may be seen in one view.

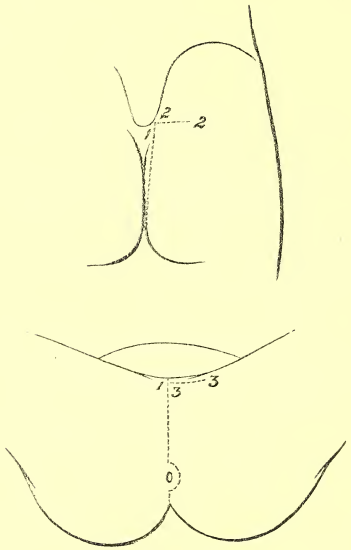
I. Skin Incisions.

1. From the **posterior superior Iliac spine** vertically downwards to the **tip of the Coccyx,** then forwards encircling the **anus** and along the **median raphe** of the Perinæum to the base of the **Scrotum.**
2. A transverse incision outwards for three inches from the upper and posterior end of No. 1.
3. A transverse incision outwards for two inches from the anterior end of No. 1.

Reflect the flap outwards and expose the **superficial fascia.** Over the Perinæum this consists of **two layers,** of which the superficial is now seen.

The following structures in their order, from before backwards, are also displayed.

1. Cutaneous arteries from—
 a. The **Superficial Perinæal branch of the Pudic.**
 b. The **Inferior Hæmorrhoidal** over the Ischio-rectal fossa, and a branch turning round the edge of the Gluteus maximus muscle.



No. 17.

 c. The **Sciatic artery** over the Gluteus maximus muscle, some offsets turning round the lower border, others perforating the muscle. The ending of the **Coccygeal** branch.
 d. The **Gluteal** passing through the Gluteus maximus muscle.
2. At the back of the Ischio-rectal fossa, an offset of

the **Inferior Hæmorrhoidal branch of the Pudic nerve**, turning round the Gluteus muscle; and

3. Branches of the **Small Sciatic nerve** external to it, and having a similar distribution.
4. The **Hæmorrhoidal branch of the fourth Sacral nerve** in the angle between the Gluteus maximus and External Sphincter ani muscles.
5. The **Coccygeal nerve** close to the Coccyx.
6. The **external branches of the posterior primary divisions of the upper three Sacral nerves**, the smallest near the Iliac crest, the largest opposite the lower end of the Sacrum, the other by the side of the Coccyx.
7. Twigs passing backwards over the upper and posterior part of the space dissected, from the **external branches of the posterior primary divisions of the upper three Lumbar nerves** as they pass over the Iliac crest.

II.

a. Take away in front the **superficial layer of the superficial fascia** of the Perinæum.

b. Clean out the fat from the **Ischio-rectal fossa**, and remove the **sheath** of the **Obturator fascia** enclosing the **Pudic vessels and nerve.**

c. Remove the **fascia lata** from the Gluteus maximus muscle behind. While these steps are being taken, the following structures will be seen:—

In Front over the Perinæum.

1. The Rami of the **Pubes and Ischium.**
2. The **Superficial Perinæal vessels** running up to the Scrotum.
3. The **Anterior** and **Posterior Superficial Perinæal nerves,**

the latter *external to* the other. These nerves communicate freely with one another.

4. More externally the **Inferior Pudendal branch of the Small Sciatic nerve.** It communicates with the **Posterior,** or **External Superficial Perinæal nerve.**

Bounding the Ischio-rectal Fossa the following Structures will be found—

5. Internally.—The **External Sphincter ani muscle,** below it the **Levator ani muscle** covered by the **Anal fascia,** and the **Coccygeus muscle.** The latter posterior to the Levator ani.
6. Externally.—The **Tuber Ischii** and below it the **Obturator fascia** covering in the **Obturator internus muscle,** forming the outer wall.
7. Posteriorly.—The inferior border of the **Gluteus maximus muscle.**

Contained in the Ischio-rectal Fossa the following Structures will be dissected—

8. In a sheath of the Obturator fascia, one and a half inches deep on the outer wall, the **Pudic vessels.** The **Inferior Hæmorrhoidal branches** are traceable transversely across the space to the lower end of the Rectum, and the **Superficial Perinæal vessels** backwards to their origin from the Pudic. Crossing the front of the fossa is the small **Transverse Perinæal artery,** which may be a branch of the main trunk, but more commonly arises from the Superficial Perinæal branch.
9. The **Pudic nerve** will be found in the outer wall of the fossa deeper than the artery, but its **Perinæal branch,** which is considerably larger than the nerve

itself, is *superficial* to the vessel. This branch will be found to be dividing in front into offsets, which may be better traced in a subsequent dissection. Opposite the Tuber Ischii the **Inferior Hæmorrhoidal branches** of the main nerve pass inwards to the lower end of the Rectum, and **communications** with the **Posterior Superficial Perinæal and Inferior Pudendal nerves** may now be followed forwards.

10. The **Hæmorrhoidal branch of the fourth Sacral nerve** may be seen passing between the Levator ani and Coccygeus muscles, or perforating the latter to be distributed to the External Sphincter muscle.

On the Buttock—

11. The **Gluteus maximus muscle** will be cleaned, and the previously mentioned branches of the **Sacral nerves** will be found perforating it.

III.

a. Remove now in front the **deep layer of the superficial fascia** of the Perinæum, detaching it from the Pubic arch externally, and from the Triangular ligament behind.

In doing this the distribution of the **Perinæal branch of the Pudic nerve** may be with advantage traced. The fascia is seen to pass over the Transversus perinæi muscle to join the Triangular ligament. The nerve will be found to divide into the following branches:—

1. The **Posterior Superficial Perinæal**, which passes on the cutaneous surface of the **Transversus muscle.**
2. The **Anterior Superficial Perinæal**, running beneath the Transversus muscle, and giving a

transverse offset to the fore part of the **Levator ani muscle.**

3. **Muscular branches,** which may be traced to the Erector penis, Accelerator urinæ, and Transversus perinæi muscles at once, and later on to the deep Transverse, and Constrictor urethræ muscles.
4. Slender **twigs to the Corpus Spongiosum.**

The fascia investing the three superficial muscles may be now cleaned away.

b. Remove the Gluteus maximus muscle from its attachments internally to the Sacrum and Coccyx, and cut it through externally in a line parallel with the reflected skin.

There will now be exposed—

In Front, the Anterior triangle of the Perinæum, bounded

Externally, by the **Crus Penis** with the **Erector muscle** lying upon it.

Internally, by the **Bulb of the Corpus Spongiosum Urethræ** covered by the **Accelerator urinæ muscle.**

Posteriorly, by the **Transversus perinæi muscle.**

The Floor, formed by the Anterior layer of the **Triangular ligament** of the Perinæum.

Under the Gluteus maximus muscle.

1. The **Great Sacro-sciatic ligament** passing between the sides of the Sacrum and Coccyx and the inner border of the Tuber Ischii. The **Small Sacro-sciatic ligament** crosses transversely beneath this from the side of the lower part of the Sacrum and the Coccyx to the Ischial spine.

2. The upper and posterior part of the **Gluteus medius muscle** is the highest of the structures displayed.
3. The **Pyriformis muscle** is next below, emerging from the great Sacro-sciatic foramen.
4. Next, the **tendon of the Obturator internus muscle** passing out from the lesser Sacro-sciatic foramen. It is overlapped here by the **Gemelli muscles**, the origins only of which are seen.
5. The **Superficial branch of the Gluteal artery** is seen between the Gluteus medius and Pyriformis muscle with its accompanying **vein**, both however are divided at their point of entrance into the Gluteus maximus muscle.
6. The **Sciatic vessels** pass from the Pelvis below the Pyriformis muscle, and the **Coccygeal branch** is seen perforating the Great Sacro-sciatic ligament.
7. The **Pudic vessels** are seen upon the spine of the Ischium, with the **Pudic nerve** inside and the **nerve to the Obturator internus muscle** outside them.
8. The **Great and Small Sciatic nerves**, the **Pudic nerve**, the **nerve to the Obturator internus muscle**, the nerve to the **Gemellus superior muscle**, and the **nerve to the Gemellus inferior** and **Quadratus femoris muscles** are exposed passing from the Pelvis below the Pyriformis. The latter two, however, are here beneath the Great Sciatic nerve. **Branches** to the **Gluteus maximus muscle** from the Small Sciatic and Sacral plexus are also seen.
9. On the surface of the **Great Sacro-sciatic ligament**, the second series of **loops** between the external branches of the posterior primary divisions of the upper three Sacral nerves is seen.
10. A **bursa** over the **Tuber Ischii** is opened.

IV.

a. Cut through in front the **Superficial Perinæal nerves** and turn them forwards.

b. Detach the **Crus Penis** and **Erector muscle** from the Ramus of the Ischium and turn it inwards. This must be done carefully, to avoid injuring the **Pudic artery**, which lies between the Crus and the bone, but a **branch which enters the Corpus Cavernosum** at this point is unavoidably divided. The **Pudic nerve** is found here with the **artery**, and a similar branch from it to the Corpus Cavernosum is cut through.

c. Remove the **Superficial Transversus perinæi muscle.**

d. Take away the **Great Sacro-sciatic ligament**, with the **Coccygeal branch of the Sciatic artery**, and the **Sacral nerves.**

e. Cut through the **Pyriformis muscle** at its point of emergence and turn it outwards.

f. Remove with the chisel the **bone** forming the inner portion of the **upper part of the great Sacro-sciatic foramen**, and the lower part of the **Sacro-iliac articular surfaces**, with the cartilage and ligaments in part. This is done to display the origin of the Pudic artery from the Internal Iliac trunk.

There will now be exposed—

In the Perinæal Region.

1. The Anterior layer of the **Triangular ligament.**
2. The **Pudic artery and nerve** piercing it, and dividing into the **branches** for the Corpus Cavernosum, which are now cut, and the branches for the Dorsum of the Penis, which pass forwards to

pierce the **Suspensory ligament**, the nerve lying outside.

The **Anterior layer of the Triangular ligament** may now be cleaned away, and the **Pudic artery and nerve** traced between the two layers. It will be found to give off a small transverse **artery to the Bulb** of the Corpus Spongiosum, which reaches that structure by perforating the Anterior layer of the ligament. There will now be exposed—

3. The Deep **Transversus perinæi muscle.**
4. The **Constrictor urethræ muscle** in front of the preceding, but usually continuous with it.

The branches of nerve from the **Perinæal branch of the Pudic** may now be traced to the preceding muscles.

IN THE ISCHIO-RECTAL REGION—

The **Pudic artery** may be traced in the outer wall of the fossa.

IN THE GLUTEAL REGION—

The Pudic artery may be followed from the **Internal Iliac** trunk in front of the lower end of the Sacral plexus, over the **spine of the Ischium** to the **Ischio-rectal fossa.** The **Sciatic and Pudic veins** must be removed to do this.

By the removal of the **Pyriformis** muscle, the following structures, in addition to those mentioned under Stage III., will be exposed—

1. Further portions of the **Gluteal,** and **Sciatic arteries.**
2. The first, second, third, and fourth **Sacral nerves** forming the plexus.
3. The first portion of the **Gluteal nerve.**
4. The **nerves to the Pyriformis** muscle from the upper and posterior part of the plexus.

5. The origin of the **Pudic nerve,** mainly from the third and fourth Sacral nerves.
6. The origin of the **Small Sciatic nerve** by two roots from the lower part of the plexus.

Note[1] on the Triangular Ligament of the Urethra.

The anatomy of the Triangular ligament of the Urethra has in the experience of the writer often proved to be somewhat of a stumbling block to students. This note is written with the view of endeavouring to make the connections of this structure clearer. The difficulty arises, I believe, from two causes: *firstly*, that *identical* parts of the Pelvic fascia have received a different nomenclature; and, *secondly*, that incorrect or at all events inexplicit accounts are given in most of the text books in ordinary use.

To obviate the first difficulty, I shall take that account of the Pelvic fascia which is now commonly received, and indeed followed by the authors usually read; but the connections of the various parts of which with the structure under consideration are either not stated explicitly, or are else erroneously given. I mean that description which states that the **Pelvic fascia** divides at some point in **a line extending from the Symphysis of the Pubes to the spine of the Ischium,** into **two parts,** one of which extends in to the various Pelvic viscera, and the other of which is continued down on the inner surface of the Obturator internus muscle to the outlet of the Pelvis. The line of bifurcation is called **the white line,** the part of

[1] Reprinted from the "Guy's Hospital Reports."

the fascia above this line is named **Pelvic**, the portion below, **Obturator**, and the piece extending in to the viscera **Recto-vesical**. Further, there is a thin fascia derived from the Obturator, which lines the under surface of the Levator ani muscle, to which the name **Anal** is applied.

But whilst laying down these hard and fast lines, I will quote here a passage from "Quain's Anatomy" (vol. i., page 327), because whilst I have been repeatedly convinced of its accuracy, I do not think that any other of the authors ordinarily read, mention the facts stated therein. It is as follows:—

"The Obturator fascia is sometimes included in the description of the Pelvic fascia, while the Recto-vesical is considered as an offset from it. It will be found however on dissection, that the Recto-vesical fascia is always most directly continuous with the Pelvic fascia, and that the Obturator fascia is only loosely connected with it. Indeed the fibres of the Levator ani muscle in most cases pass upwards to some extent beyond the white line, and thus separate the Obturator from the Pelvic fascia."

We will now take the various descriptions[1] given of the anatomy of the Triangular ligament. We shall find that there is no difficulty about the **Anterior or Superficial lamella**, for this is described by all as a *special layer of fascia closing the upper part of the Pubic arch.* It is in the connections of the **Deep layer**, that the discordant accounts, real or apparent, are given. Thus in "Gray's Anatomy" (page 751) it is stated "the Posterior layer is *derived from the Pelvic fascia*," and again (pp. 755-56) the *Pelvic fascia* "is continuous below the Pubes with

[1] The italics are my own, in all the succeeding quotations.

the fascia of the opposite side, so as to close the front part of the outlet of the Pelvis, blending with the Posterior layer of the Triangular ligament ;" and, further, the Obturator fascia "is a direct continuation of the Pelvic fascia below the white line, and is *attached to the Pubic arch*." The inference from this account is, I take it, that the Posterior layer is formed by the *Pelvic fascia*, closing the Pelvis in front and beneath the Symphysis, and that the Obturator division takes no part in the formation of the Triangular ligament, but stops short at the Pubic arch.

In "Quain's Anatomy" (vol. i., page 326), we find "this layer (*i.e.* Deep layer of Triangular ligament) is superficial to the anterior fibres of the Levator ani, which lie between it and the *Pelvic fascia*,[1] and is *connected with a thin web of areolar tissue which extends backwards on the surface of the Levator ani muscle, and is distinguished as the Anal fascia*." The Obturator division is described as being attached to the Rami of the Pubes and Ischium.

There is nothing said as to the connection of the Triangular ligament with the Pelvic fascia, or with any part of it, and I think that we must either infer that both layers of the ligament are to be looked upon as *special fasciæ*, or that else the Deep layer is derived from the *Anal fascia*.

In Heath's account of the Triangular ligament, no mention is made of its connection with any part of the Pelvic fascia, but in describing the *Recto-vesical layer* (page 261), the following is stated, "it is seen to dip down to the Prostate, and is thus continued from one

[1] The word *Pelvic* must here be read in connection with the passage quoted above (vol. i., page 327). *Recto-vesical* is probably meant as being a direct continuation of the *Pelvic fascia*.

side to the other of the Pelvis, of which it closes the outlet."

In "Ellis's Anatomy" (eighth edition, page 546), no distinction is made between Pelvic and Obturator fasciæ, but the *whole membrane lining the inner surface of the Obturator muscle is called Pelvic,* and the following statement is made:—"Inferiorly the fascia is attached to the hip bone along the side of the Pubic arch." He is here speaking of the part *below the white line, i.e.,* the Obturator division of other writers. On page 549, it is stated that the Recto-vesical fascia between the Pubo-prostatic ligaments of opposite sides "dips down to reach the Triangular ligament of the Perinæum, and closes the Pelvis between the Levatores ani." On page 429 we find, "The Posterior layer (of the Triangular ligament) is *derived from the Recto-vesical fascia.*" Here, then, we have another account of the origin of this layer.

I may here note that in the sixth edition of this writer's work (page 587), the account given of the Pelvic fascia differs substantially from the later one just quoted; in that, it (the Pelvic fascia) is stated to be "continued from the one hip bone to the other, so as to close the cavity of the Pelvis in front for a short distance," and that, on page 458, it is said that "the Posterior layer (*i.e.,* of the Triangular ligament) is derived from the Pelvic fascia;" we must, however, of course, take the later description, which gives the origin from the Recto-vesical fascia.

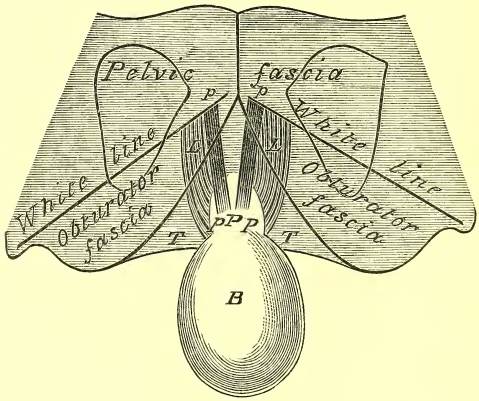
I think I have quoted enough to justify the statement that the connections of the Posterior layer of the Triangular ligament may well be a stumbling block, for we have the following different accounts given:—

1. **From the Pelvic fascia (Gray).**
2. **A special structure, or from the Anal fascia (Quain).**

3. **From the Recto-vesical fascia (Ellis).**

It seems to me that the following considerations may make the matter clearer.

1. The Pubic arch is of course below the level of the Symphysis.



No. 18.

DIAGRAM OF THE POSTERIOR SURFACE OF THE SYMPHYSIS PUBIS, showing the divisions of the Pelvic fascia and the connections of the Posterior layer of the Triangular ligament.

P. Prostate.

B. Bladder, drawn backwards.

p. p. Pubo-prostatic ligaments.

L. L. Anterior fibres of Levatores ani, arising from the lower part of the Symphysis.

T. T. The Posterior layer of the Triangular ligament.

The white line corresponds to the cut edge of the Recto-vesical fascia. The Pubo-prostatic ligaments to the anterior edges of the same; between these there is an interval in which the Recto-vesical fascia dips down in the median line to join the Posterior layer of the Triangular ligament and the Capsule of the Prostate. The Pubo-prostatic ligaments are above the Levatores ani muscles.

2. The white line extends from the *lower part* of the Symphysis Pubis.

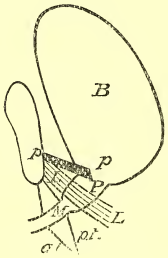
Therefore the *Triangular ligament must be below the level of the Pelvic fascia*, which only extends as far down as the white line.

I believe the true account, and it is one which I have verified by dissection, to be as follows:—

The **Superficial layer** is a *special fascia*. All accounts here agree. The **Deep layer** is formed by the **Obturator fascia**, which anteriorly is found to stretch across the Pubic arch and close it; or perhaps a little more exactly, the Obturator fascia may be described as running down to be fixed to the margin of the Pubic arch, and a little above its attachment to give off a process which passes across the upper part of the arch, and which, joining with a like process from the fascia of the opposite side, forms the Deep layer of the Triangular ligament. If, therefore, in Gray's account for *Pelvic* we write *Obturator*, it would be correct. The Triangular ligament *is* continuous behind with the Anal fascia, but I do not think that the second alternative of Quain's description is correct, viz., that the Posterior layer is derived from the Anal fascia, for this would be tracing a comparatively thick membrane from a very thin one, and as to the first, that it is a special structure not connected with any division of the Pelvic fascia, I would say that I have often made out the continuity with the Obturator piece.

Finally, we have Ellis's derivation from the Recto-vesical layer. This to my mind cannot be the case, for, as is indeed expressly stated by Quain, the fibres of origin of the Levator ani muscle from the Symphysis Pubis, are found distinctly, between the Recto-vesical fascia and the Posterior layer of the Triangular ligament.

It is, however, a fact that the Recto-vesical fascia closes the Pelvis *above* these attachments of the Levatores ani, "between the Pubo-prostatic ligaments of opposite sides," except in the centre, where it dips down to join the Prostate, leaving a small interval; but this makes another layer closing the Pelvis just below the Symphysis, and we have indeed from without inwards—



No. 19.

ANTERO-POSTERO VERTICAL SECTION THROUGH THE BLADDER AND SYMPHYSIS PUBIS.

B. Bladder.

P. Prostate.

M. Membranous Urethra.

p. p. Pubo-prostatic ligament.

L. L. Levator ani, arising from the Symphysis, and placed between the Pubo-prostatic ligament (*i. e.*, Recto-vesical fascia) and the Posterior layer of the Triangular ligament.

p. t. Posterior layer, and

a. t. Anterior layer of the Triangular ligament.

1. The Superficial layer of the Triangular ligament.

2. The Deep layer of the same, derived from the Obturator fasciæ.

3. The Recto-vesical fascia.

And between the Recto-vesical fascia and the

Triangular ligament, a median septum is formed by the former dipping down in the centre to join the latter. On either side of this there is a little space bounded above by the Recto-vesical fascia, below by the Deep layer of the Triangular ligament, and internally by the median septum, externally by the Pubic bone, and in this the anterior fibres of the Levator ani muscle run up to the Symphysis.

The above statement is pretty nearly a reprint of my note in the "Guy's Gazette." Since it was written I have consulted Henle, and I gather that allowing for his difference of description, the connections are much the same as given above. "Handbook of Anatomy," vol. ii., part 1, pp. 406-8, p. 525, and fig. 402, and pp. 541-42.

I find also that Godlee in the text to Part VI. of his Plates makes the following statements (page 220) :—"It (Obturator fascia) is to some extent continuous, along the arch of the Pubes, with the Posterior layer of the Triangular ligament." And again (page 221) :—"The Posterior layer of the Triangular ligament * * * at its attachment to the Pubic arch may be said to be continuous with the Obturator fascia."

A Dissection to Expose the Profunda Femoris Artery.

Position.—The subject lying upon its back, the thigh abducted, and rotated out, the knee flexed, so that the foot of the side to be dissected rests upon the opposite thigh.

I. Skin Incisions.

1. From immediately below the centre of Poupart's

ligament along the upper two thirds of a line leading to the **internal Condyle** of the Femur.

2. An oblique incision at the upper end of No. 1, reaching for one and a half inches on either side, parallel with Poupart's ligament.
3. A transverse cut at the lower end of No. 1, for one and a half inches on either side.

Reflect the flaps inwards and outwards, and expose the **superficial fascia.**

This will be found at the upper part of the thigh to consist of **two layers,** which are most easily separable on the inner side of the Saphenous vein.

Dissect out in it—

1. The **Superficial External Pudic artery,** at the upper and inner part.
2. The **Superficial Epigastric artery,** passing upwards over the centre of Poupart's ligament.
3. The **Superficial Circumflex Iliac artery** at the upper and outer part.
4. Small arteries derived **from the Femoral** trunk will be seen, with the several cutaneous nerves to be mentioned below.
5. The **Long Saphenous vein** receiving branches corresponding to the three above-named arteries, and at the upper part a large branch which collects the blood from the inner and back parts of the thigh; sometimes there is a corresponding branch on the outer side.
6. Cutaneous twigs of the **Internal Cutaneous nerve,** one perforating near the Saphenous opening, and one or more lower down the thigh.
7. The **Middle cutaneous nerve** perforating the deep fascia at about the centre of the thigh, about three

inches below Poupart's ligament. There are two branches, of which the outer is only seen to a small extent.

8. The **Crural branch of the Genito-crural** nerve cutaneous, near the middle line, about one inch below Poupart's ligament. It is seen to **communicate** below with the **Middle Cutaneous nerve.**
9. Numerous **lymphatic vessels** in front of the thigh running upwards to **lymphatic glands,** which are found arranged in a row along the Long Saphenous vein.

II. Remove the preceding structures, and expose the **deep fascia.**

At the upper and inner part of the thigh, immediately below Poupart's ligament, the **Saphenous opening** will be displayed: and the deep layer of the superficial fascia (**Cribriform fascia**) which is attached to its margins being removed, a portion of the **Femoral sheath** will appear at its outer part.

III.

a. Clear away the **deep fascia.** In doing this the attachment of the **superior Cornu** of the Saphenous opening to Poupart's ligament must be divided. The cutaneous nerves should be preserved.

b. Remove fat, fascia and lymphatics, from Scarpa's triangle.

There will now be exposed—

1. The lower portions of the **Sartorius** and **Adductor longus muscles.**
2. The **Psoas** and a portion of the **Iliacus muscles** at the upper and outer part, most external of those forming the floor of Scarpa's triangle; the Iliacus being outermost.

3. The lower part of the **Pectineus muscle.**
4. A small piece of the **Adductor brevis muscle,** between the Pectineus and the Adductor longus muscles.
5. A portion of the **Vastus internus muscle** below.
6. The **Crural sheath** covering in about the upper two inches of the Femoral vessels, and the ordinary areolar sheath below it. This, however, will most probably be taken away in cleaning the triangle, if not, it should now be removed. It will then be seen that the sheath is divided into three compartments by two fascial septa, the outermost one of which contains the **Femoral artery,** the middle the **Femoral vein,** and the innermost, which is only half an inch in length, contains a lymphatic gland.
7. The **Femoral artery** is seen giving off the **Superficial Pudic, Epigastric, and Circumflex Iliac arteries,** at the upper part, and lower down the **Inferior External Pudic twig,** which crosses inwards over the Pectineus muscle. The **Profunda branch** arises from one to two inches below Poupart's ligament on the outer side, but is exceedingly variable in its place of origin, and may come off at any point between Poupart's ligament and four inches below it. The **Internal and External Circumflex** branches of the Profunda artery may be seen at their origins, the former passing backwards between the Psoas and Pectineus muscles, the latter running out between the Superficial and Deep divisions of the Anterior Crural nerve. These last two branches, however, are also very variable in origin, and are often found arising from the Common Femoral trunk. **Muscular branches** of the Femoral artery are also displayed.

8. The **Femoral vein** is seen receiving branches similar to those of the main artery, except that the twigs corresponding to the Superficial Pudic, Epigastric, and Circumflex Iliac arteries run into the **Long Saphenous vein**, which also is seen to join the Femoral vein quite at its upper part. The Femoral vein at Poupart's ligament lies internal to the artery, but at the apex of Scarpa's triangle is beneath it; the **Profunda vein** is superficial to its artery, so that in Scarpa's triangle these two large veins lie between the Superficial and Deep Femoral arteries.
9. The **Anterior Crural nerve** is displayed lying between the Psoas and Iliacus muscles, about half an inch to the outer side of the Femoral artery. The **Middle and Internal Cutaneous**, and the **Internal Saphenous offsets** are traceable from it. Parallel with the last nerve, but external to it, a large **nerve to the Vastus internus muscle** may be seen. The Middle Cutaneous branch is found supplying the Sartorius muscle, and the two small **nerves to the Pectineus** muscle, which pass beneath the Femoral artery, may be followed. The distribution of the other **muscular branches** to the Rectus and Vastus externus muscles cannot be traced, but they are seen at their origins.
10. By separating slightly the Pectineus from the Adductor longus muscles, the **Superficial division of the Obturator nerve** is seen lying upon the small portion of the Adductor brevis muscle which is exposed. A slender twig of this nerve which runs along the inner border of the Adductor longus muscle may now be found. It is distributed to

the Obturator plexus, but the ending cannot now be traced.

IV. Divide now the **Sartorius muscle** at the lower part of the dissection, and turn it outwards and inwards. Beneath it is found the **aponeurotic covering of Hunter's canal**, which should be taken away. In addition there will now be seen—

1. Further portions of the **Femoral artery and vein**, the latter passing to the outer side of the artery. The **Anastomotica Magna branch** of the artery, coming off at the lower part of the canal.
2. More of the **Long Saphenous nerve.** It may lie on the outer side of the artery throughout the extent of the canal, or it may cross from the outer to the inner side, over it.
3. The branch of the **Obturator nerve** to the plexus of the same name may now be traced to its **communication** with the Inner branch of the **Internal Cutaneous nerve.**
4. Both **Anterior and Inner branches of the Internal Cutaneous nerve** will be seen, the former lying upon the artery, the latter to its inner side. A **communication** between the **Inner branch and the Saphenous nerve** is traceable, thus completing the so-called **Obturator plexus.**

V.

a. Hook outwards the **Anterior Crural nerve** dividing the Internal Cutaneous and Long Saphenous branches.

b. Cut through the **Femoral artery** at its lowest part, and hook the ends upwards and downwards, dividing at the same time its **muscular offsets.**

c. Remove the **Femoral and Profunda veins.**

d. Divide the tendinous insertion of the **Adductor longus muscle**, and pull the muscle inwards.

There will now be exposed—

1. The lower part of the **Adductor magnus muscle**, at its attachment to the Femur.
2. The whole length of the **Profunda Femoris artery**, and the origin of its branches, viz., the **Internal** and **External Circumflex**, and the **four Perforating** ; the upper two of which pierce the Adductor brevis muscle, the third and fourth (which last is the termination of the artery) passing to the back of the thigh through the Adductor magnus muscle.

VI. The **Adductor magnus** muscle must be divided at its Femoral attachment, behind the opening for the Femoral artery, to follow out the terminal or fourth Perforating twig.

A Dissection to Expose the Gluteus Minimus Muscle.

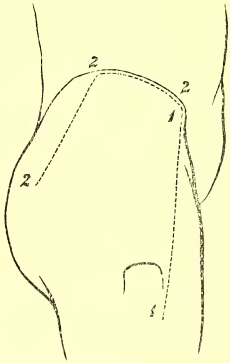
Position.—The body lying on its face, the Abdomen and the Pelvis raised on blocks, and the legs hanging down to a moderate degree.

I. Skin Incisions.

1. From the **anterior-superior Iliac spine** to the anterior-inferior angle of the **great Trochanter.**
2. From the upper end of No. 1, along the anterior two thirds of the **Iliac crest**, and then downwards and backwards to a point three inches below the **posterior-superior Iliac spine.**

Reflect the flap downwards, and expose the loose fascia of the buttock, containing—

1. The **posterior branches** of the **External Cutaneous nerve** most anteriorly.
2. The **Lateral Cutaneous branch**[1] **of the last Dorsal nerve**, crossing the Iliac crest, and running as far as the Trochanter major.



No. 20.

3. The **Iliac branch of the Ilio-hypogastric nerve**[1] posterior to this.
4. The **external branches of the posterior primary divisions of the first three Lumbar nerves**, crossing the Iliac crest still further inwards.
5. The **external branches of the posterior primary divisions of the first two Sacral nerves**,—the upper one near the Iliac crest, the lower giving filaments over the lower part of the surface exposed.

[1] These nerves bear an inverse ratio to one another as to their size.

II. Remove the preceding structures and expose—

The **fascia lata** forming externally the **Ilio-tibial band**, above covering the Gluteus medius muscle, and dividing to enclose the Gluteus maximus muscle.

III. Remove the **fascia** covering the Gluteus maximus, and reflect this **muscle** inwards, by dividing the upper part of its fascial insertion and the fleshy fibres, in a line corresponding to the lower margin of the reflected skin. In doing this—

a. The **Superficial branch of the Gluteal artery** will be divided.

b. The **Inferior Gluteal branches of the Small Sciatic nerve** will be cut, with **arteries** from the **Sciatic.**

c. **Branches to the reflected muscle** from the part of the Sacral plexus formed by the first and second nerves will be seen.

c. The **bursæ** over the great Trochanter, and the Vastus externus muscle will be opened.

Divide the **Tensor vaginæ femoris** muscle at its origin, and hook it well forwards, cutting the branches supplying it from the Gluteal artery and nerve.

There will now be exposed, from above downwards:—

1. The **Gluteus medius muscle.**
2. The **Pyriformis muscle.**
3. The **Gemellus superior muscle.**
4. The **Obturator internus muscle.**
5. The **Gemellus inferior muscle**, at its insertion.
6. The **Vastus externus muscle** on the outer side.
7. The **Trochanter major**, below and externally.
8. Beneath the Tensor vaginæ muscle is an **anastomosis**

between the Gluteal, External Circumflex, and Circumflex Iliac arteries.

9. The divided **Superficial branch of the Gluteal artery** and **vein** above the Pyriformis muscle.
10. The **Sciatic artery** and **vein** emerging below the Pyriformis muscle.
11. The **Pudic artery, vein,** and **nerve,** leaving the Pelvis at the same spot; the artery giving a branch to the Digital fossa.
12. The **Great and Small Sciatic nerves** are seen below the muscle.
13. The **nerve to the Obturator internus muscle** is seen crossing the spine of Ischium, usually having the Pudic artery to its inner side and the Pudic nerve still more internal.
14. The small **nerve to the Gemellus superior muscle** may be seen by pulling outwards the Great Sciatic nerve.

IV. Cut through at their origins and insertions, the **Gluteus medius,** and **Pyriformis muscles,** and remove them. **Branches** of the **Gluteal artery** and **nerve** will be divided in taking away the former muscle.

1. The **Gluteus minimus muscle** will now be fully exposed, and lying upon it the **Gluteal nerve** and **Deep branch of the artery** of the same name. Each divides into an **upper** and **lower** branch, the former of which runs along the upper margin of the muscle, the latter crosses it, passing downwards and outwards; the nerve to supply the Tensor vaginæ femoris muscle, and the artery to join in the anastomosis previously mentioned.

The Great Sciatic nerve may be required to be pulled inwards a little from off the muscle.

2. All the structures previously mentioned as leaving **the Pelvis below the Pyriformis** muscle will be more fully seen, and in addition
3. The **Pelvic fascia** on the deep surface of the Pyriformis muscle.

A Dissection to Expose the Popliteus Muscle.

Position.—The leg lying on its anterior surface.

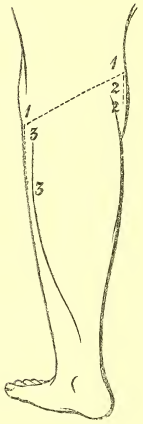
I. Skin Incisions.

1. From the middle of the outer surface of the **external Condyle of the Femur** obliquely downwards and inwards across the back of the joint to the upper margin of the **inner Tuberosity of the Tibia** at its centre.
2. From the outer end of (1) vertically downwards for one inch.
3. From the inner end of (1) vertically downwards for the upper third of the leg.

Reflect the flap downwards, and expose the **superficial fascia**, containing—

1. Branches of the **Internal Saphenous nerve** running backwards over the Tibia at its inner part.
2. The **Inner branch of the Internal Cutaneous nerve** posterior to this.
3. **Branches** of the **Small Sciatic nerve** perforating the fascia over the Popliteal space, and **the nerve itself** coming through just below it.
4. Branches of the **External Popliteal nerve** supplying the skin at the outer part.

5. On the inner side a cutaneous artery from the **Anastomotica Magna.**
6. The termination of the **Sciatic artery** with the Small Sciatic nerve, but here reinforced by a branch from the **Popliteal.**
7. A cutaneous artery on the outer side from the **Popliteal,** which accompanies the External Popliteal nerve.



No. 21.

8. The **Internal Saphenous vein** along the inner border of the Tibia.
9. The **External Saphenous vein** along the centre of the space, and usually perforating the fascia lata opposite the centre of the articulation, but sometimes running up higher.
10. **Lymphatics.**

II. Remove the preceding structures including the Internal Saphenous vein. This exposes the **fascia lata,**

strengthened over the Popliteal space by transverse fibres. This must be taken away, and then the following are exposed—

1. Above and externally, the tendon of the **Biceps muscle** inserted into the head of the Fibula and split by the **Long External Lateral ligament.**
2. Below, externally and internally, portions of the heads of the **Gastrocnemius muscle,** the greater part of the inner being visible.
3. A part of the origin of the **Plantaris muscle,** above the outer head of the Gastrocnemius muscle.
4. On the inner side and below, the tendons of the **Semimembranosus** and the **Semitendinosus muscles,** the prolongation of the latter to the fascia lata is divided.
5. Along the median line, the **Internal Popliteal nerve** giving off **branches** below, to both heads of the Gastrocnemius, to the Plantaris, Soleus, and Popliteus muscles, the commencement of the **Inferior Internal Articular nerve,** and a cutaneous branch running downwards to the integument of the calf, and called the **ramus Communicans Tibialis,**[1] or sometimes the **External Saphenous nerve.**
6. The **External Popliteal nerve** following the tendon of the Biceps muscle. A **slender branch** of this, or of the Great Sciatic nerve, which comes off above the limits of the dissection, may be seen lying on its outer side; it gives off, above, the **Superior External Articular,** and below, the **Inferior External Articular** branches, the latter of which passes beneath the

[1] For simplicity's sake these branches should be called the Communicans Tibialis and Communicans Fibularis, and the nerve which results from their junction the External Saphenous.

outer head of the Gastrocnemius muscle. The **External Popliteal nerve** gives off the **ramus Communicans Peronei**[1] or **Fibularis**, which perforates the fascia lata considerably above the ramus Communicans Tibialis.

7. The **Popliteal vein** below and internal to the Internal nerve, receiving the **External Saphenous** branch, and other **veins** corresponding to the offsets of the artery to be next enumerated.
8. The **Popliteal artery** below and internal to the vein, and almost hidden by it and the Internal nerve. **Branches** running up **to the Ham-string muscles** and others descending to the calf are seen (**Sural**), the **Superior External Articular** artery with the corresponding nerve, **the Inferior Internal and External Articular** offsets, with the nerves of the same name, and the **Azygos** branch. There is also a **cutaneous branch** previously seen accompanying the External Popliteal nerve.
9. Four or five **lymphatic glands** or fewer along the Popliteal vessels.

III.

a. Hook the **Semitendinosus**, and **Semimembranosus muscles** internally.

b. Divide the **Gastrocnemius muscle** above and below, and remove it within the limits of the skin incisions. Its **nerves** and **arteries** will be divided, and there will now be exposed—

1. The **Popliteus muscle** at the upper part of the Tibia,

[1] For simplicity's sake these branches should be called the Communicans Tibialis and Communicans Fibularis, and the nerve which results from their junction the External Saphenous.

covered by its **special fascia** derived from the tendon of the Semimembranosus muscle.

2. The **Soleus muscle** below it.
3. The **Plantaris muscle** crossing it, passing over the vessels and the Internal nerve.

The Plantaris should be taken away, inasmuch as it crosses the next-mentioned structures.

4. More of the **Internal Popliteal nerve** and the **branches** more fully—viz., to the **Soleus muscle**, to the **Popliteus muscle**. The nerve to this latter muscle is seen turning round the lower border. The **Inferior Internal Articular branch** running along the upper border of the Popliteus muscle, and beneath the expansion of the Semimembranosus muscle with the corresponding artery.
5. A further portion of the **Popliteal artery**, and its **branches** enumerated above, more fully.
6. More of the **Popliteal vein.**

IV.

a. Divide now and remove the **Popliteal artery and vein**, and the **Internal Popliteal nerve.**

b. Cut through the **Biceps** tendon. Open the **Capsule** of the joint by removing its outer part, and divide the **Long** and **Short External Lateral ligaments.**

c. Remove the **fascia** over the Popliteus muscle, and trace out the tendinous origin of the muscle from the external Condyle.

The whole of the **Popliteus muscle** will be now exposed, and in addition—

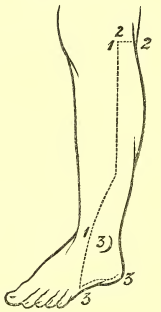
1. The **ligament of Winslow.**
2. More of the **Inferior External Articular nerve, and vessels.**

A Dissection to Expose the Peroneal Artery and its Branches.

Position.—The body supine, the leg rotated outwards and lying upon its inner aspect.

I. Skin Incisions.

1. From the **head of the Fibula** along the upper two thirds of the bone, to the centre of the anterior surface of the **ankle-joint.**



No. 22.

2. A transverse incision from the upper end of No. 1 backwards, to a little beyond the middle of the **posterior surface of the leg.**
3. A third from the lower end of No. 1 downwards and forwards to the **base of the fifth Metatarsal bone,** then backwards along the inner border of the foot to the **centre of the heel.**

Reflect the flap backwards, and expose the **superficial fascia** and the following parts—

1. The **triangular subcutaneous surface** and the **external Malleolus** of the Fibula.
2. The **External Saphenous vein**, from its commencement at the outer side of the Dorsum of the foot, upwards behind the outer ankle and along the median line of the leg through the whole extent of the dissection.
3. **Cutaneous arteries.**
 - *a.* From the **Popliteal** above and externally, with branches of the External Popliteal nerve.
 - *b.* From the **Sciatic** along the median line, with the Small Sciatic nerve, reinforced by twigs from the **Popliteal artery.**
 - *c.* Numerous branches from the **Peroneal** along the outer border of the Fibula, and others behind the external Malleolus.
 - *d.* From the **Anterior Tibial** artery in front of the Fibula, with branches of the Musculo-cutaneous nerve; and the **External Malleolar** arterial branch in front of the ankle.
 - *e.* Twigs from the **External Plantar** and **Tarsal arteries** at the outer side of the Dorsum of the foot.
4. Cutaneous branches of the **External Popliteal nerve** at the upper and outer part; one larger than the rest, called **ramus Communicans Fibularis**, running downwards and inwards to the middle of the calf.
5. The small portion of the **Communicans Tibialis nerve** seen superficial to the deep fascia, a little above the centre of the calf.
6. The nerve called **External Saphenous** resulting from

the junction of the preceding, and accompanying the vein of the same name behind the external Malleolus to the outer border of the foot.

7. The **Small Sciatic nerve** perforating the fascia lata just below the Popliteal space, running down the middle of the leg, and **joining** the Communicantes Tibialis and Fibularis nerves just at their union. Branches of this nerve are cutaneous at the upper part.
8. In front of the Fibula branches of the **Musculo-cutaneous nerve**, which run to the fourth and fifth toes, and other filaments supplying the skin on the outer side of the Dorsum of the foot.

II. Remove the preceding structures and expose the **fascia lata**, which will be seen forming the upper and lower divisions of the **Anterior Annular ligament** in front of the ankle, and the **External Annular ligament** between the Malleolus and Os Calcis. In front of the exposed portion of the Fibula the fascia is very strong, and joined to the outer border of the bone.

III. Remove the above fascial structures and expose—

1. The **Gastrocnemius muscle** and **tendo Achillis.**
2. The outer border of the **Soleus muscle**, seen beneath the preceding.
3. The **Peroneus longus muscle** lying on the Fibula, and covering in the **Peroneus brevis muscle** except for the anterior part of the lower third.
4. The lower part of the **Peroneus tertius muscle** in front of the Fibula.
5. The upper part of the origin of the **Extensor brevis digitorum muscle** on the Dorsum of the foot.

6. The **Anterior Peroneal artery** and vein in front of the lower end of the Fibula, and on the outer side of the Dorsum of the foot.
7. The small portion of the lesser **Sciatic nerve**, which, in this dissection, lies beneath the fascia lata.
8. The greater part of the **Communicans Tibialis nerve**, which is beneath the deep fascia.
9. The **External Popliteal nerve** at the upper part of the head of the Fibula.

IV. Divide the **Gastrocnemius and Soleus** muscles above as far as the centre, and pull them well inwards. In doing this, the **nerve** to the latter will be probably cut through.

Remove the **aponeurotic arch** over the upper part of the Posterior Tibial vessels and nerve.

There will now be exposed—

1. The **Popliteus muscle** covered by its **fascia** at the upper part, with its **nerve** lying on the posterior surface, and turning round the lower border.
2. The **aponeurosis** stretching over the **Tibialis posticus muscle**, between the bones of the leg, immediately below it. The **fibres of the muscle** are visible through the aponeurosis.
3. The **Flexor longus pollicis muscle**, lying on the lower two thirds of the inner surface of the Fibula.
4. The **Popliteal artery** and its bifurcation. The **Anterior Tibial branch** passing between the lower border of the Popliteus muscle and the Tibialis posticus muscle. The **Posterior Tibial branch** lying on the aponeurosis of the Tibialis posticus muscle, and giving off the **Peroneal artery**, which runs downwards and outwards for a short distance to enter the substance of the Flexor longus pollicis muscle.

5. The **venæ comites** of the preceding, uniting to form the **Popliteal vein.**
6. The **Posterior Tibial nerve** at first to the inner side of the artery of the same name, but soon crossing it to the outer side. The **branches** to the **Tibialis posticus** and **Flexor longus pollicis** muscles are seen, the latter running with the Peroneal artery.

V.

a. Trace down the **Peroneal artery** in the substance of the Flexor longus pollicis muscle, divide the muscle below and pull its lower end downwards. The **nutrient** and **muscular branches** will be now seen.

b. Divide the **External Annular ligament** if not done previously, and open up the **sheath of the Peroneus longus muscle** at the outer border of the foot.

c. Cut through the **Peronei longus** and **brevis muscles,** and turn the ends upwards and downwards.

d. Saw through the **Fibula** at the junction of the lower with the upper three fourths, and again two inches lower down, above the external Malleolus. Remove this piece of bone by dividing the attached fibres of the **Tibialis posticus** and **Peroneus tertius muscles** and the **Interosseous** and **Inferior Interosseous ligaments.** The **Peroneal artery** may now be followed in its whole course. Below, it is seen lying on the **posterior Tibio-fibular ligament,** and receiving the **communicating branch** from the **Posterior Tibial** artery, which may come over or under the tendon of the Flexor longus pollicis muscle. The artery may be traced down behind the

external Malleolus to its **anastomoses**, with twigs of the **Tarsal** and **External Plantar** arteries. The **Anterior Peroneal branch** may be followed round the front of the outer ankle to its **anastomoses** with the **External Malleolar** and **Tarsal arteries.**

A Dissection to Expose the Plantar Arch.

Position.—The foot must be arranged with the Plantar surface uppermost. In an entire body this will best be done by turning the subject on the face, flexing the knee, and supporting the leg with blocks.

I. Skin Incisions.

1. Along the **median line of the foot** from the Os Calcis to the root of the third toe.
2. Transverse incisions **from the anterior and posterior ends of this,** to the inner and outer borders of the foot and heel respectively.

Reflect the flaps inwards and outwards, and expose the **superficial fascia.** Clear it away, dissecting out at the same time—

1. The **Superficial Transverse ligament,** across the roots of the toes in the rudimentary web of the foot.
2. The **Lumbricales muscles,** with the Digital vessels and nerves in the intervals of the Plantar fascia.
3. The **Plantar Cutaneous branches** of the **Posterior Tibial artery, vein, and nerve,** in the hollow of the heel.
4. At short distances from the inner and outer borders of the foot along the furrows of the internal and external intermuscular septa, some small **unnamed**

arteries and nerves derived from the Internal and External Plantar, respectively.

5. At the clefts of the toes, the **Digital vessels and nerves** will be found issuing from between the processes of the Plantar fascia and passing beneath the Superficial Transverse ligament; those to the inner side of the first and the outer side of the fifth toes, however, perforate further back than the rest. The origin of these vessels and nerves is not now traceable.
6. When the superficial fascia or fat is completely removed, the preceding vessels and nerves will be displayed, and **the Plantar fascia.** This will be found to be made up of three portions: a central, thick and triangular, with its apex at the heel, and its base cut into five processes, one for each toe; and two lateral portions which are thin and unimportant, except that there is a **strong process on the outer side** between the Os Calcis and the base of the fifth Metatarsal bone.

II. Remove now the **Plantar fascia,** by a longitudinal incision along the median line, and a transverse one at the Os Calcis. Reflect it forwards; in doing this **two septal processes,** one on each side of the Flexor brevis digitorum muscle, will be found. The Digital vessels and nerves and the Lumbricales muscles are to be preserved, the rest of the above-mentioned structures will be removed. There will now be displayed—

1. The **Abductor pollicis muscle,** along the inner border of the foot.
2. The **Flexor brevis digitorum muscle,** along the centre of the foot. It is found to be giving off four tendons, one to each of the four outer toes, these

are seen entering their corresponding sheaths, which reach for a short distance into the foot.

3. The **Lumbricales muscles** are seen in the intervals of the tendons of the Flexor brevis digitorum muscle. The innermost one is on the Tibial side of the tendon to the first toe, the others are in the intervals of the tendons; they pass to the Tibial side of the first Phalanges.
4. The **Abductor minimi digiti muscle**, along the outer border of the foot.
5. The **tendon of the Flexor longus pollicis muscle** in part, on the outer side of the Abductor pollicis muscle.
6. Small portions of the insertions of the **Flexor brevis pollicis muscle**, into the inner and outer sides of the base of the Metatarsal Phalanx of the great toe.
7. A small part of the **Flexor brevis minimi digiti muscle** at its insertion into the first Phalanx, lying on the inner side of the Abductor minimi digiti muscle.
8. The **Internal Plantar artery and vein**, in the anterior part of its course emerging from beneath the Abductor pollicis. Different accounts of the ending of this artery are given. According to Gray and Quain, it terminates by running along the inner side of the great toe. Ellis's description is that it gives off four branches, the innermost of which runs to the inner side of the great toe, the outer three dip down in the first, second, and third interosseous spaces to join the Digital branches of the Deep Plantar arch. I believe that both accounts are true in different cases.

9. The **External Plantar artery and vein**, in a small part of their course. They are seen at the anterior and outer part of the foot, between the Abductor minimi digiti muscle and the outer border of the Flexor brevis digitorum muscle. The branch to the outer surface of the little toe is visible.

10. The **Internal Plantar nerve**, emerging with the corresponding artery from beneath the Abductor pollicis, and dividing in front into four **Digital branches** which lie upon the tendons of the Flexor brevis digitorum, one undivided for the inner side of the great toe, the others bifurcating at the clefts of the toes to supply the contiguous sides of the first and second, second and third, and third and fourth. In this dissection they are only seen as far as the bifurcation. By separating the Abductor pollicis from the Flexor brevis digitorum posteriorly, branches may be traced **from the trunk of the Internal Plantar** nerve **to these muscles.** The **innermost Digital offset** will be found supplying the Flexor brevis pollicis muscle, the **next two the two innermost Lumbricales muscles**, and the **outermost communicates** with the inner of the two Digital branches from the **Superficial division of the External Plantar nerve.**

11. The **Superficial branch of the External Plantar nerve**, appearing between the Abductor minimi digiti and the Flexor brevis digitorum muscles, a little anterior to the base of the fifth Metatarsal bone. It is seen dividing into two **Digital branches**, one undivided for the outer side of the little toe, the other bifurcated for the contiguous sides of this toe and the next.

III.

a. Cut through the **Internal Plantar nerve** behind, and throw it over the toes. The branches of the **artery of the same name**, to the second, third, and fourth interosseous spaces, must be divided if present.

b. Divide the **Flexor brevis digitorum** muscle, and throw it towards the toes. Its **nerve from the Internal Plantar** will be torn through.

There will now be exposed—

1. The **tendon of the Flexor longus digitorum muscle.** This is seen to be dividing into four slips, one for each of the four outer toes. They each enter the corresponding Digital sheath beneath the Flexor brevis tendon. The following are also seen connected with this muscle, viz.—

 a. **The Accessorius muscle**, passing from the Os Calcis to the hinder border of the tendon of the Flexor longus digitorum, but from which tendinous slips are traceable to those tendons of the long Flexor which run to the second, third, and fourth toes (Turner). A portion of the **Inferior Calcaneo-cuboid** or **Long Plantar ligament** is seen behind close to the Os Calcis, between its two heads of origin.

 b. The **Lumbricales muscles.** The innermost arising from the Tibial side of the innermost tendon, the other three from the contiguous sides of the first and second, second and third, and third and fourth tendons.

2. The **tendon of the Flexor longus pollicis muscle**, lying beneath (in this position) the Flexor longus digitorum muscle. A tendinous slip passes from the

former to the latter at the hinder part of the foot, and is said to be traceable to the slips of the Flexor longus digitorum, running to the second and third toes (Turner).

3. A further portion of the **Flexor brevis pollicis muscle**, running to each side of the base of the first Phalanx of the great toe, with the tendon of the Flexor longus pollicis lying between these two heads.
4. The **Flexor brevis minimi digiti muscle**, lying upon the Metatarsal bone of the little toe.
5. The **Plantar and Dorsal Interossei muscles** of the fourth space, the former lying externally.
6. The **External Plantar artery**, with its accompanying **vein.** The vessel is seen behind, emerging from beneath the Abductor pollicis muscle, and running obliquely forwards and outwards over the Accessorius muscle to a point opposite the base of the fifth Metatarsal bone. It then turns transversely inwards, and passes beneath the tendon of the Flexor longus digitorum muscle; just as it makes this bend it gives off the **branch to the outer side of the little toe**, which has been previously seen.
7. The **External Plantar nerve**, taking the same course as the artery as far as the base of the fifth Metatarsal bone. At that point it is divided into a **Superficial** and a **Deep branch.** The former has been already seen dividing into two **Digital branches** for the little, and the opposed side of the fourth toe; besides this, the outermost of the two is now seen to be supplying the **Flexor brevis minimi digiti muscle**, and often the **Interossei muscles of the fourth space**; the inner has been found to communicate with the fourth Digital branch of

the Internal Plantar nerve. The **Deep division** passes, with the External Plantar artery, beneath the tendons of the Flexor longus digitorum. The **trunk of the External Plantar nerve** may be now found supplying branches to the **Accessorius** and **Abductor minimi digiti** muscles, in the posterior part of its course which was previously covered by the Flexor brevis digitorum.

IV.

a. Divide the **tendon of the Flexor longus digitorum** and **the Accessorius muscle** transversely at their junction. This point is taken in order to leave the Accessorius muscle with the External Plantar vessels and nerve lying upon it. The **tendons of the long Flexor muscle**, with the attached **Lumbricales**, should now be reflected over the toes. As this is done two slender **nerves to the two outermost Lumbricales** will be found coming from the **Deep branch of the External Plantar nerve**. There will now be exposed—

1. The **Flexor brevis pollicis muscle**, most internally.
2. The **Adductor pollicis muscle**, external to this parallel with its outer border.
3. The **Flexor brevis minimi digiti muscle**, lying upon the fifth Metatarsal bone.
4. The **Transversalis pedis muscle**, lying transversely across the Metatarso-phalangeal articulations.
5. The **Plantar and Dorsal Interossei muscles**, of the third and fourth spaces, and just the anterior end of the Plantar of the second, lying in the triangular interval formed by the Adductor pollicis, Flexor brevis minimi digiti, and Transversalis pedis mus-

cles. The Adductor pollicis may, however, conceal the Interossei of the second space completely.

6. Further portions of the **External Plantar vessels.** The portion of the artery which extends beyond the base of the fifth Metatarsal bone is called the **Plantar arch.** The **Digital branches** of the arch which run forwards in the fourth and third spaces, and the anterior part of the one in the second space, will be seen. They pass in front beneath the Transversalis pedis muscle. The **Posterior Perforating offsets** of the two outer Digital branches, which pass through the heads of the Dorsal Interossei to the Interosseous arteries of the Dorsum may be traced, but only the anterior part of the Digital branch of the second space will be seen, as the posterior part is concealed by the Adductor pollicis muscle. Each of these Digital branches is seen to bifurcate at the cleft of the toes, and from the point of bifurcation other slender offsets (**Anterior Perforating**) also to the Dorsal Interosseous arteries, are traceable.

7. The **Deep branch of the External Plantar nerve** may be followed to its ending in the Adductor pollicis muscle. **Branches** are traceable to the **Transversalis pedis,** and at this stage only to the **Interossei** of the third space, and the fourth when not supplied by the Superficial division. The offsets to the **two outer Lumbricales** have been already seen.

V.

a. Remove now the **Adductor pollicis muscle** and the outer portion of the **Flexor brevis pollicis muscle.** The nerves to the former from the Deep division of the External Plantar will be divided.

There will now be exposed—

1. The **Interossei muscles** of the first and second spaces.
2. The remaining portion of the **Plantar arch** and its **junction** at the back of the first interosseous space, with the communicating branch from the **Dorsalis Pedis artery.** The **Digital branch** of the second space is now displayed, and its **Posterior Perforating offset** is now traceable.
3. The arteria **Magna Pollicis** is seen arising from the Dorsalis Pedis artery, where it dips into the sole of the foot. This divides into **two branches**, the outer of which runs forwards in the first space, and bifurcates for the contiguous sides of the great toe and the next, and the inner of which passes beneath the tendon of the Flexor longus pollicis and innermost head of the Flexor brevis pollicis, to the inner side of the great toe.
4. The **nerves to the Interossei** muscles of the first and second spaces are now traceable from the **Deep division of the External Plantar nerve.**

The **Plantar arch** is now fully exposed. If the whole of the **External Plantar artery** is to be uncovered, it will be necessary to remove the posterior part of the **Abductor pollicis muscle** and the lower portion of the **Internal Annular ligament.**

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ERRATA.

Page 23, § VII. 2, *for* "muscle," *read* "nerve to the Internal Pterygoid muscle."

Page 32, two lines from bottom, *for* "Facial," *read* "Lingual."

Page 65, nine lines from top, *for* "from before backwards," *read* "from behind forwards."

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pan. Common. Covers ~~fronto~~ which of Animals
occ. fronto
platysma ? Mm. of Expression } P.O. represents
Mimic of Face } ? Mimic
retrogressive evolution



Post Cut Branches of Post Sac Dorsal Nerves
come out in a line with outer border of
Erector Spinae and divide into two
First three Lumbar are Cut of Buttocks
Fourth Lumbar Muscular
Fifth Lumbar joins 1st Sacral which joins 2nd
which joins 3rd, which joins 4th which joins
5th which joins Coccygeal
Fifth Lumbar is only Muscular
From the loops of Post Sacral Plexus Post Sac
as far as 3rd. Stopping behind over Sacro Sciatic Plexus

Post-Δ² Week ——— p. 7.